"A PROSPECTIVE, RANDOMIZED STUDY COMPARING THE VIDEO LARYNGOSCOPE AND STANDARD DIRECT LARYNGOSCOPY FOR INTUBATION IN THE PEDIATRIC AIRWAY"

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IN

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BRANCH X

INSTITUTE OF ANAESTHESIOLOGY & CRITICAL CARE
MADRAS MEDICAL COLLEGE
CHENNAI- 600 003

APRIL 2015

CERTIFICATE

This is to certify that the dissertation entitled, **"A Prospective, Randomized Study Comparing The Video Laryngoscope And Standard Direct Laryngoscopy For Intubation In The Paediatric Airway."** submitted by Dr.KARTHIKEYAN.J in partial fulfilment for the award of the degree of Doctor of Medicine in Anaesthesiology by Tamilnadu Dr.M.G.R Medical University, Chennai is a bonafide record of the work done by him in the Institute of Anaesthesiology & Critical Care, Madras Medical College, during the Academic year 2012-2015.

Prof Dr.B.Kala, M.D.,DA.,
Director & Professor,
Institute of Anaesthesiology
& Critical Care,
Madras Medical College,
Chennai- 600 003.

Prof Dr.V.Pankajavalli, MD., DA.,
Institute of Anaesthesiology
& Critical Care,
Madras Medical College,
Chennai- 600 003.

Prof.Dr.R.Vimala, M.D.,
Dean,
Madras Medical College,
Chennai – 600003.

DECLARATION

I, **Dr.Karthikeyan.J**, solemnly declare that this dissertation entitled **"A Prospective, Randomized Study Comparing The Video Laryngoscope And Standard Direct Laryngoscopy For Intubation In The Paediatric Airway"** is a bonafide work done by me in the Institute of Anaesthesiology and Critical Care, Madras Medical College, Chennai, during the period 2012 to 2015 under the guidance of **Prof.Dr.V.Pankajavalli, MD.,DA.,** Professor, Institute of Anaesthesiology and Critical Care, Madras Medical College and Government General Hospital, Chennai – 3 and submitted to The Tamilnadu Dr.MGR Medical University, Guindy, Chennai – 32, in the partial fulfilment of the requirements for the award of the degree of MD Anaesthesiology (Branch X).

DR.KARTHIKEYAN.J

Place: Chennai.
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CONTENTS

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DR.KARTHIKEYAN J*

GUIDE

Prof Dr.V.PANKAJAVALLI M.D.,D.A.,

Co-GUIDE

ASST PROFESSOR Dr.R.AHILA MD.,

INSTITUTE OF CHILD HEALTH AND RESEARCH CENTRE,

MADRAS MEDICAL COLLEGE,

EGMORE,

CHENNAI-600008

ABSTRACT

Background: Intubation in children is increasingly performed using video laryngoscopes. Many pediatric studies examine novice laryngoscopists or describe single patient experiences. This

prospective randomized single blinded trial compares intubation time for the video laryngoscope with standard direct laryngoscopy.

Methods: Sixty subjects presenting for elective surgery were randomly assigned to intubation using VL or DL. Intubation time(TTI), time to best view(TTBV), Cormack lehane grading, and number of attempts were documented.

Results: We observed that there was statistical significance since the mean TTBV is 5.67 sec for video laryngoscope group where as it was 4.83 sec in direct laryngoscope group(p=0.001). Hence the time taken for best view is more in case of video laryngoscopy than in direct laryngoscopy. Time taken to intubate for VL group was (mean=21.50sec) and for DL group(mean=17.70sec) which shows statistical significance (p=0.01). Thus time taken for intubation was more in video laryngoscopy than direct laryngoscopy. . In video laryngoscopy group, 96.67% of the patients had CL grade I view whereas 53.34% of patients in direct laryngoscopy group. 3.33% in videoscope group has Grade II views when compared to 43.33% in direct laryngoscopy group. The results showed statistical significance

(p=0.001) when analysed with chi square test (pearson) and paired t test. This shows improved laryngoscopic view with video laryngoscopy when compared with direct standard laryngoscope. In our study comparing the number of attempts needed did not show any statistical difference between the video and direct laryngoscope.

(p value 0.64 using chi square).

Conclusions: We hereby conclude that, Video laryngoscope gives a better visual quality in terms of improved and magnified glottis view when compared to the direct conventional laryngoscope in paediatric patients but at the cost of slightly longer time for better visualisation and intubation. Further experience and conclusions drawn from more randomized clinical trials should be documented before introducing video laryngoscopy as an alternative to the gold standard technique of direct laryngoscopy**.**

(Key words: Laryngoscopy, Intubation, Paediatrics)

INTRODUCTION

Management of the airway is the most important skill in anaesthesia especially in paediatrics. Tracheal intubation using a laryngoscope is considered to be the gold standard of airway management during administration of general anaesthesia and in critical care settings both in adults as well as in paediatric population because of its several advantages including [13, 15]

- Respiratory failure(inadequate oxygenation or ventilation)
- Inadequate respiratory drive.
- Cardiac arrest (emergency resusucitation).
- Hemodynamic instability or shock.
- Progressive neuromuscular weakness(with respiratory compromise)
- Isolation of respiratory tract from GI system and hence minimal risk of aspiration in absent airway reflexes.

- Allows delivery of anaesthetic gases and oxygen via positive pressure
- Upper airway obstruction.
- Access to tracheo-bronchial tree for pulmonary hygiene and drug administrations.
- Improved surgical access to head and neck and in laparoscopic surgeries.

American society of anaesthesiologists Paediatric Closed Claims data demonstrate a greater incidence of undesirable airway related problems in the paediatric age groups. Paediatric closed claim analysis states that respiratory issues accounted for 73% of all adverse events, most frequently related to inadequate ventilation (38%) followed by oesophageal placement of tracheal tube(17%) and difficult intubation(18%)

There are several important differences between the Paediatric airway anatomy and adult airway anatomy. Knowledge of these differences is required for the management of the

paediatric airway. Airway management in the paediatric patient may require general anaesthesia before intubation attempts, which might not be the initial approach in a cooperative adult patient. Indirect (video) laryngoscopes facilitate visualization of the vocal cords without the need to align the oral, pharyngeal, and tracheal axes.

AIM OF THE STUDY

To compare intubating conditions with video laryngoscope and direct laryngoscopy in elective paediatric surgical patients with respect to,

1. Visual quality and ease of intubation,
2. Intubation time,
3. Advantages of using video laryngoscope.

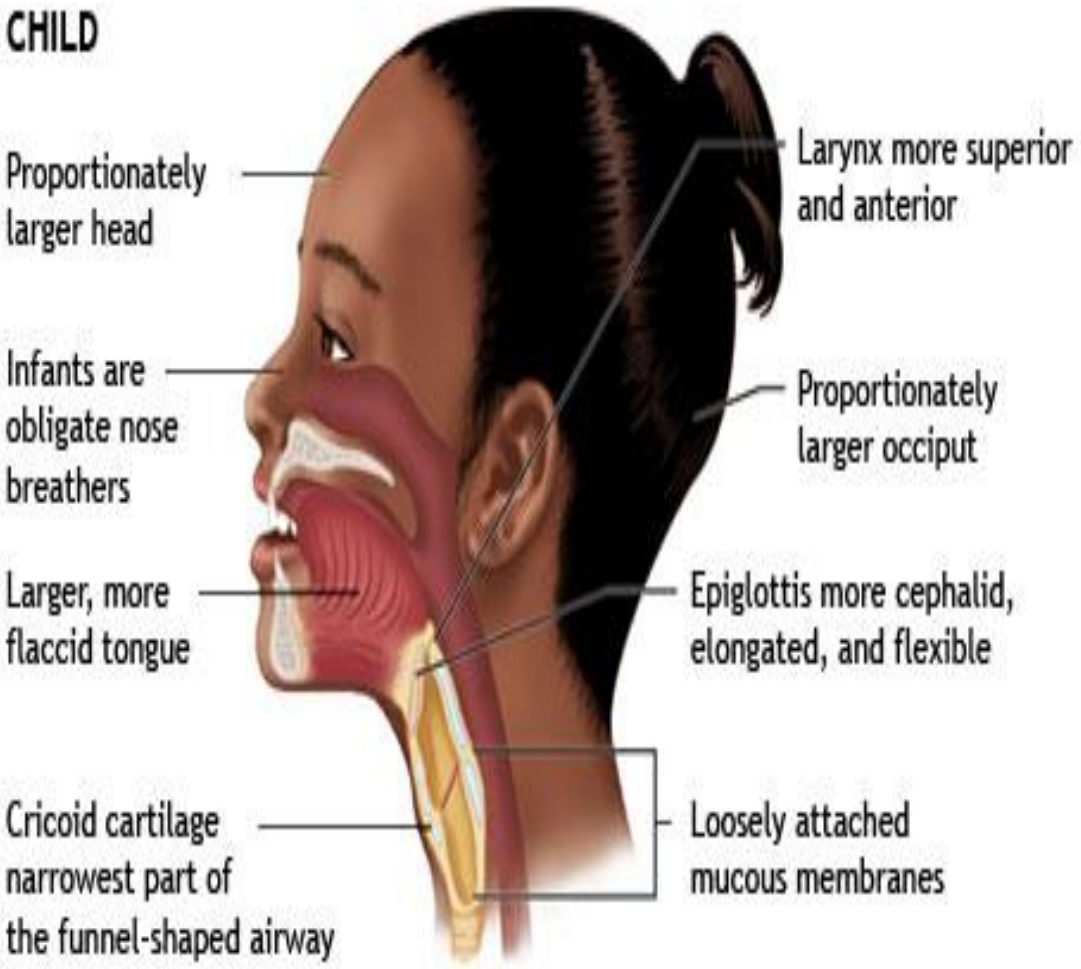


Figure showing the airway anatomy of a child.

II. ANATOMY OF THE PAEDIATRIC AIRWAY

The paediatric airway is different from the adult airway. Understanding these differences is important when managing the paediatric airway.

Table 1. Differences Between The Pediatric And Adult Airway

- Disproportionally larger heads
- Disproportionally bigger tongues
- The narrowest region is the subglottic airway
- Poor cervical spine support
- The epiglottis is more floppy and U-shaped
- The larynx is more anterior and cephalad
- Smaller tracheal length

A. Larynx

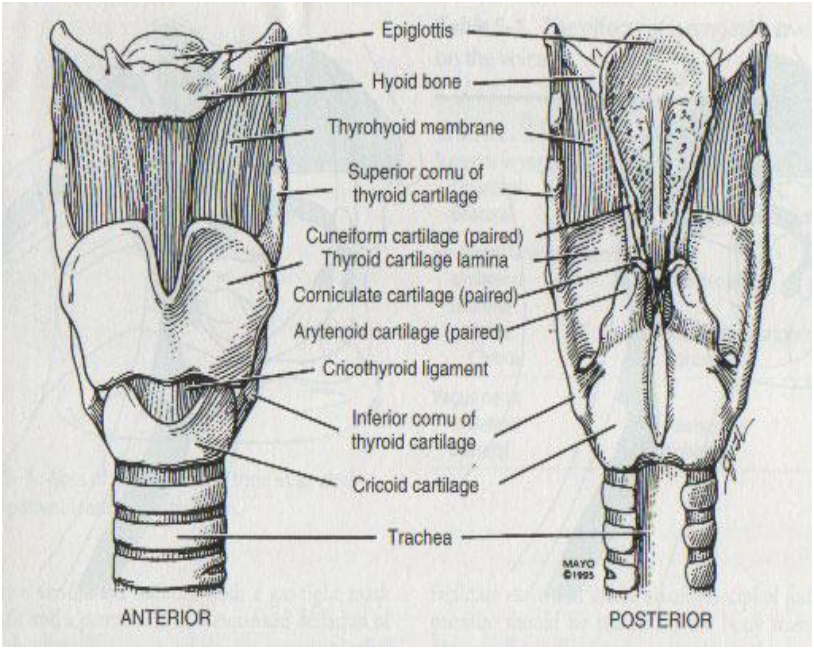


Figure showing anterior and posterior view of larynx

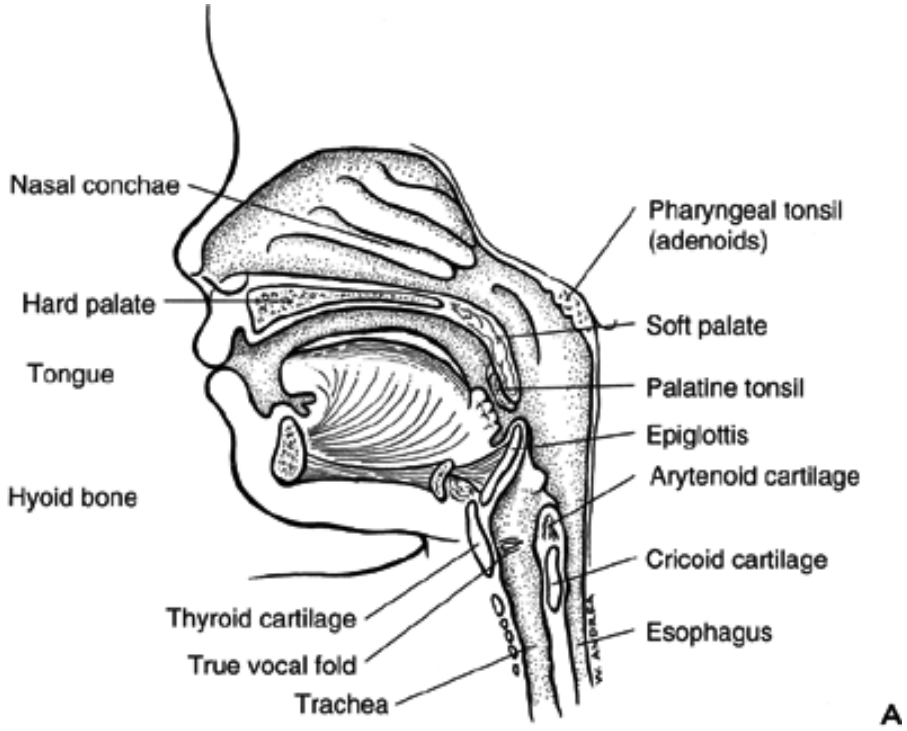
The larynx composed of hyoid bone and a series of cartilages.

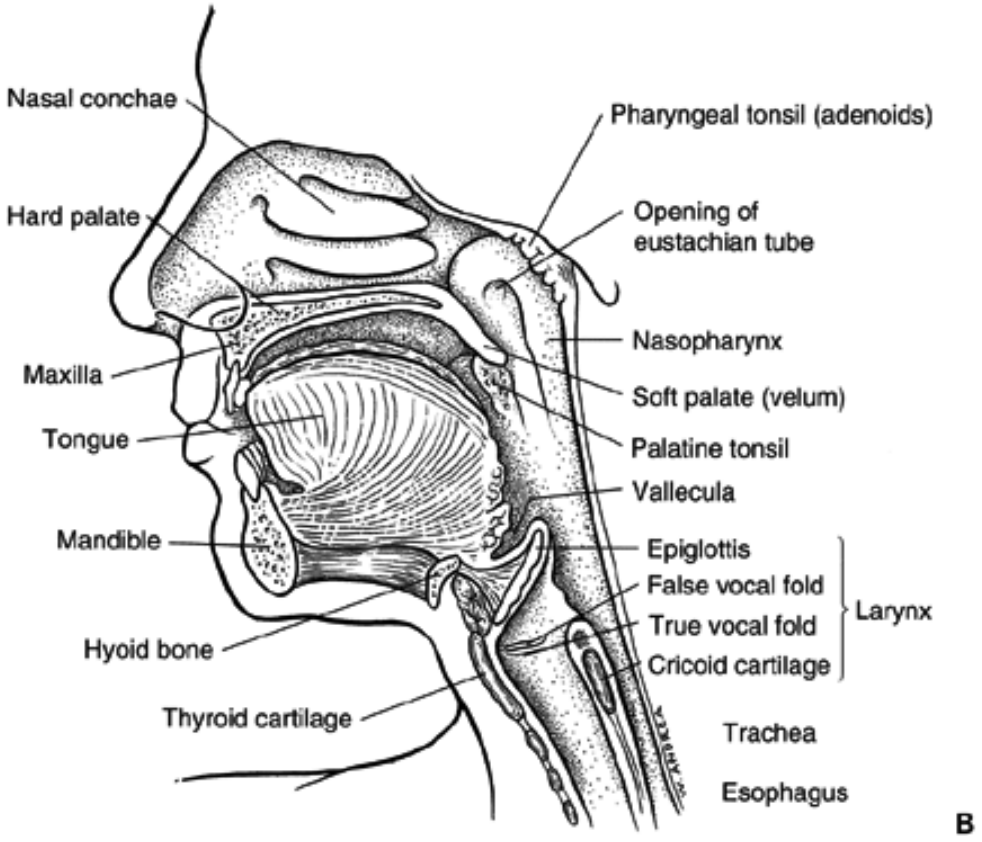
Unpaired : Thyroid, Cricoid, epiglottis

Paired : Arytenoids, Corniculate, Cuneiform

The Laryngeal folds are paired aryepiglottic folds, paired vestibular folds, paired vocal folds, Interarytenoid fold, Thyrohyoid fold.

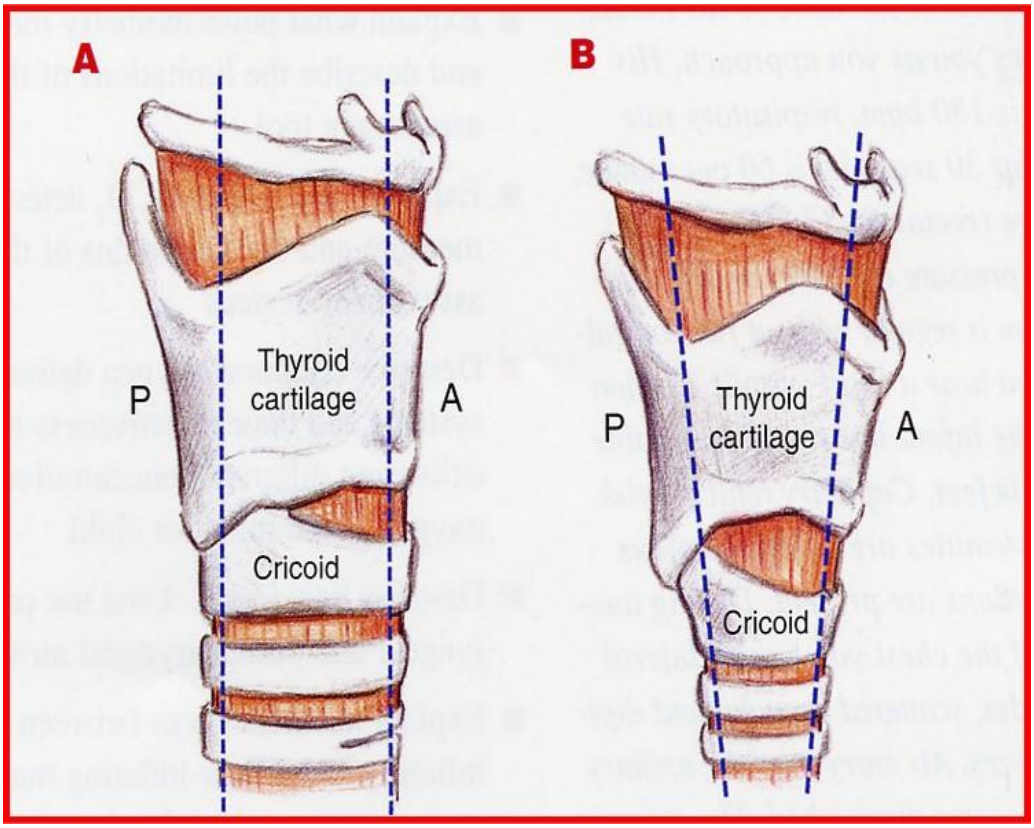
The larynx lies more cephalad at the third and fourth cervical (C3-C4) vertebra level in the infant and migrates to C5 level(adult) by 6 years of age.





A.Infant B.Adult

As the infant's larynx is more cephalad, the tongue is located nearer to the palate and easily opposing the palate. Hence upper airway obstruction may occur during anaesthetic induction. Because of the cephalad position of the larynx and the large occiput, the sniffing position does not help in visualizing the paediatric larynx. Infants should be positioned with the head and the neck in a neutral position.



A-ADULT **B-INFANT**

B. Epiglottis

The infant epiglottis is stiff, long and often called as Ω (omega) shaped. Because of Oblique angulation of epiglottis, visualizing the larynx may be difficult with Macintosh laryngoscope. It may be needed to lift epiglottis tip with the blade in order to visualise the vocal cords. Hence straight blades such as Miller are often preferred.

C. Subglottis

The cricoid cartilage is the most narrowest portion of the infants airway, about 5 to 5.5 mm in diameter, when compared with cords of the adult airway. The Paediatric larynx is often funnel shaped , whereas it is cylindrical in case of an the adult . Tight fitting ET tubes may compress the mucosa and can cause airway oedema and increases the resistance to air flow. Resistance to air flow is inversely proportional to fourth power of radius of the lumen.

LARYNGOSCOPIC ANATOMY[15]

The laryngoscopic anatomy or the structures visualised during a laryngoscopy determine the success in securing the airway. At laryngoscopy, the structure visible first is the base of the tongue and as the scope progresses the vallecula and the anterior surface of the epiglottis become visible. The laryngeal opening then comes into the view.

The aryepiglottic folds are seen on either side running posteromedially from the lateral aspects of the epiglottis. Within the cavity of larynx,

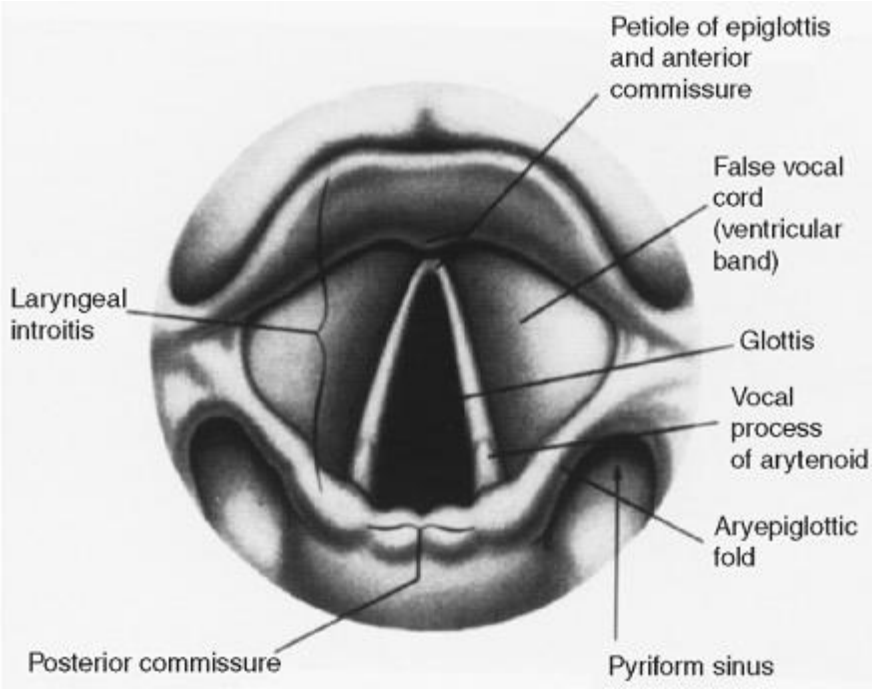


Figure showing Laryngoscopic view

There are two folds of mucous membrane on each side. The upper fold is the vestibular fold and is also called as the false vocal cords whereas the Lower fold is the vocal fold also known as the true vocal cords. The vocal cords appear pale in colour and their extension is from the angle of thyroid cartilage in front to the vocal processes of the arytenoids backwards. The opening in

between the vocal cords is triangular and is called the rimaglottidis.

LARYNGOSCOPE

Commonly used laryngoscopes can be classified under two types

CONVENTIONAL LIGHT LARYNGOSCOPE:

Blades have its lamp near the blade distal end and have an electrical Connection to illuminate the lamp powered by batteries in handle.

Example includes:

- Macintosh type laryngoscopes(curved blades)
- Miller type laryngoscopes and other straight blade designs
- McCoy laryngoscope and variants (articulating tip)

Macintosh type laryngoscope

Miller laryngoscope (straight blades)

McCoy laryngoscope

FIBRE OPTIC LIGHT LARYNGOSCOPE:

Advancement in newer lighting technologies eliminated electric wires, lamps & contacts from blade thus producing a very dependable cold and brighter illumination. Now LED/XENON lamps that produce excellent light, which follows a quartz glass fibre optic bundle or plastic along the blade to illuminate a patients oral cavity are used.

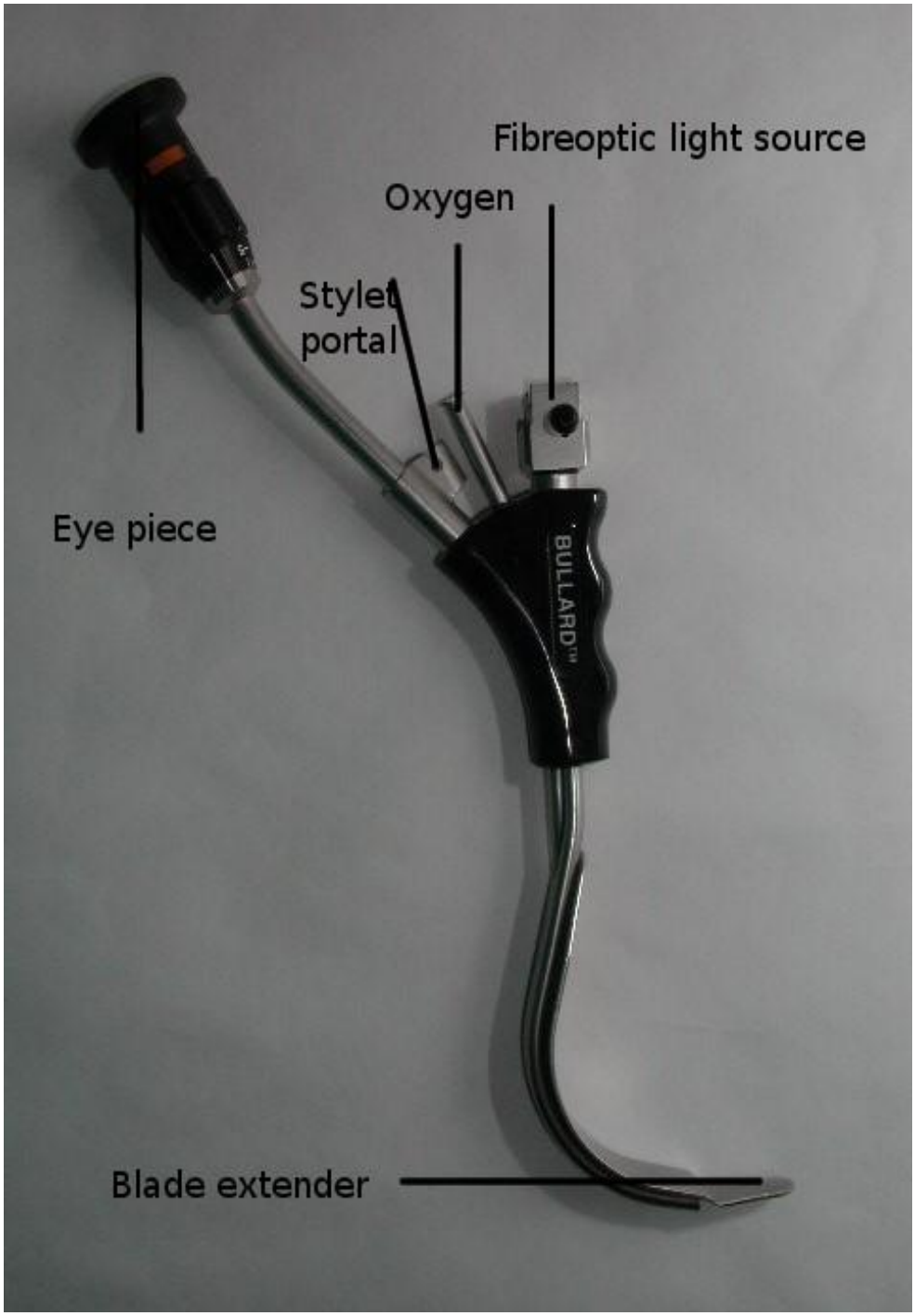
Laryngoscopes using fibre optic principle include:

Rigid Fibre optic Laryngoscopes

- Bullard laryngoscope
- Upsher laryngoscope
- Wu laryngoscope

Video Laryngoscopes (with micro miniature TV camera)

Flexible Fibre optic Laryngoscopes (Bronchoscopes).

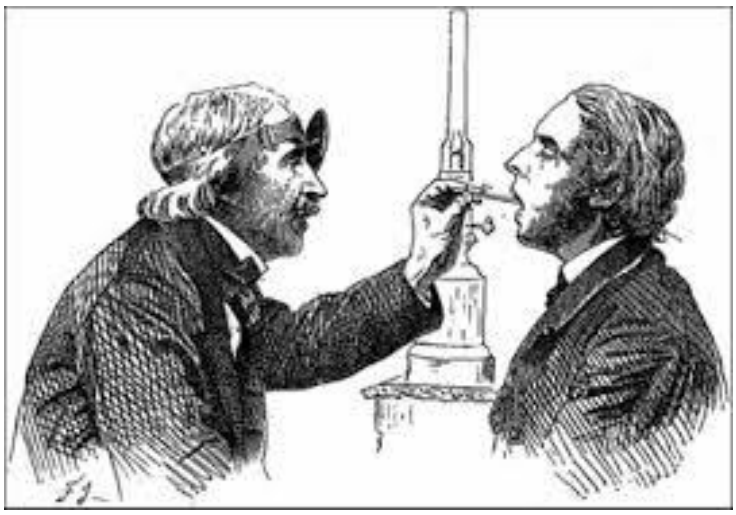


Bullard Laryngoscope

HISTORY OF LARYNGOSCOPE

The history of the laryngoscope can be traced to the middle of the eighteenth century; it is only since the early decades of the twentieth century that visualisation of the vocal cords has been important in anaesthesia.

- **Vesalius** in 1543 reported the first tracheal intubation in an animal
- First laryngoscope was invented in1854 by **Manuel Garcia**. He became the first man to visualize the glottis in an alive human. Garcia developed a tool that used two mirrors for which the sun served as an external light source (indirect laryngoscopy). By using this device he was able to observe the function of his own glottis.



- In the early 1870, **Trendelenberg** from Germany peformed the first endotracheal anaesthesia in man.

- In 1895, **Alfred kirstein** of Germany first described direct visualization of the cords. He performed the first direct laryngoscopy in Berlin

- In 1913 the first anaesthetic laryngoscope was invented by **Jackson.** His laryngoscope blade has a light source at its distal tip.

- Modern day laryngoscope systems began in early 1940s.

- In 1942, curare was introduced as a muscle relaxant for abdominal relaxation during general anaesthesia and endotracheal intubation became routine in major abdominal and other surgeries.

- In 1941, **Robert Miller** designed a blade with a curve on the bottom and a curved distal tip, which is now known as the Miller blade.

- **Robert Macintosh** designed a blade with a continuos curve in 1943. The added curve was designed to lessen the chance that there would be damage to the patient's upper teeth

- Modifications over the years have been made to both blades for the purpose of providing more optimal intubating conditions.

- The camera screen straight video laryngoscope was invented by **Dr.jon Berall**, NYC internist and Emergency Medicine Physician, U.S.patent granted in october 1988

- The first successful design of a video laryngoscope was presented to market as the Glidescope Video laryngoscope in 2001 by **Dr.John Pacey**, a Vancouer Vascular surgeon.

- The flexible fibre optic bronchoscope was introduced in 1966 by **Shigeto Ikeda**.

- The flexible fibre scope was employed for tracheal intubation by Dr.Peter Murphy in 1967. Since then the FOB techniques has been widely used for anaesthetic purposes.

MACINTOSH LARYNGOSCOPE

Macintosh laryngoscope consists of a handle and detachable blade .The light source is energised when the blade and handle are locked in the working position.

Handle:

The handle provides the power source for light. A hook on hinge folding connection between the handle and the blade is most commonly used. The handle is fitted with a hinge pin that fits a slot on the base of the blade. This allows quick and easy attachment and detachment. Handles have a metallic contact, which completes an electrical circuit when the handle and blade are in working position.

Laryngoscope handle available in different sizes

Blade:

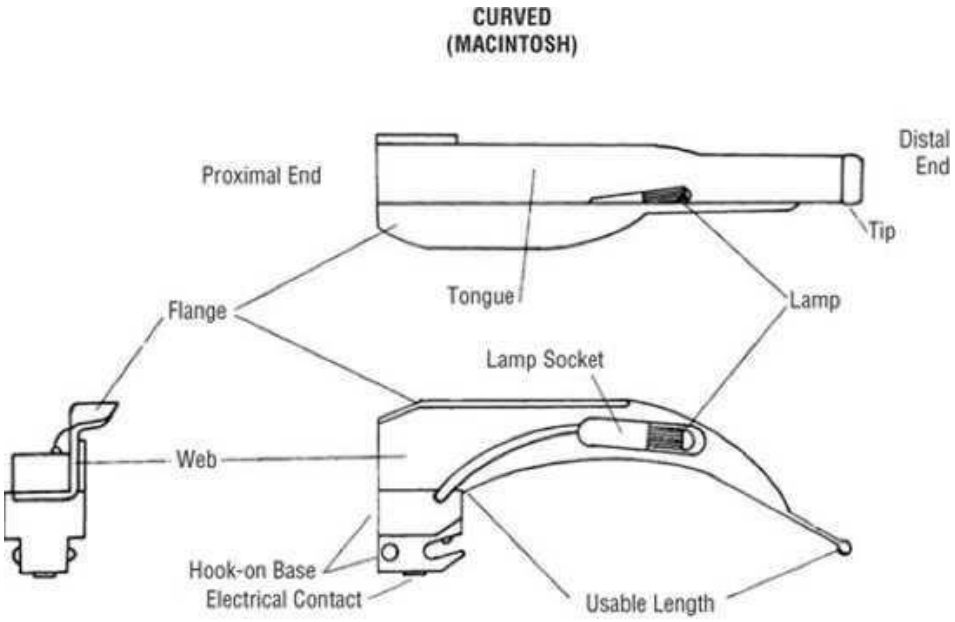


Figure showing parts of a Macintosh blade

The blade is the rigid component that is inserted into the mouth, The blade is composed of base, heel, tongue, flange, web, tip, and light source. The tongue or spatula is the main shaft. It has smooth, gentle curve that extends to the tip. It serves to compress and manipulate the soft tissues especially the tongue and lower jaw. The flange projects off the side of the tongue and is connected to it by the web. It serves to guide instrumentation and deflect tissues out of the line of vision. The flange determines the cross sectional shape. In Macintosh blade the cross section forms a reverse Z. The tip or beak contacts the vallecula and helps to elevate the epiglottis. It is usually blunt to decrease trauma. In Macintosh blade bulb or fibre optic light source can be connected.

INTUBATION WITH MACINTOSH LARYNGOSCOPE:

Proper preparation should include airway assessment, assembling and checking airway equipments and finally achieving optimal position. Positioning the height of the table at

the level of laryngoscopist naval helps to achieve a straight line between the operator's eye and the patient's upper airway.

The Macintosh blade should be held with the left hand at the junction of the handle and the blade, while the right thumb and index finger open the mouth. Laryngoscope blade should be introduced from the right side of the patient's mouth without engaging lips and teeth. When half of the blade is introduced tongue should be swept to the left as laryngoscope blade is moved to the centre.

On deeper entry into the oral cavity, the blade tip is positioned between the base of the tongue and the pharyngeal surface of the epiglottis (vallecula). At this stage the tongue and the pharyngeal soft tissues are lifted to expose the glottis opening.

VIDEO LARYNGOSCOPE:

The video laryngoscope is a rigid indirect video laryngoscope with integrated tube guidance. It is a self-contained device powered by an alkaline battery included in the laryngoscope handle. The core of the laryngoscope blade is the

high intensity light emitting diode fibre and a small digital camera at the distal end.

The miniaturized colour liquid crystal display screen mounted on the proximal end of the laryngoscope handle is movable and allows viewing of anatomical structures and the tracheal intubation process. The operator can perform intubation while watching the LCD monitor. The built-in monitor screen has a wide viewing angle and is readily visible from behind and from the side of the airway scope, allowing staff other than the operator to verify the tracheal intubation status. In addition, the airway scope's video output allows a group of people to view the images on an external medical monitor. The video monitor allows simple yet accurate verification during tracheal intubation procedures.

Video Laryngoscope Using Macintosh-Based Blades

- A.P. Advance
- Direct Coupled Interface (DCI) Video Laryngoscope System
- C-MAC Video Laryngoscope System

- McGrath MAC Video Laryngoscope
- GlideScope Direct
- Truview Picture Capture Device (PCD)

Video Laryngoscope Using Highly Curved Blades

- GlideScope
- McGrath Series 5
- A.P. Advance Difficult Airway Blade and the C-MAC D-Blade

Video Laryngoscope with Tube Guiding Channels

- King Vision
- Pentax Airway Scope
- Airtraq

C MAC

MCGRATH MAC

AP ADVANCE

GLIDESCOPE

TRUVIEW PCD LARYNGOSCOPE[7]

Figure showing Truview Laryngoscope

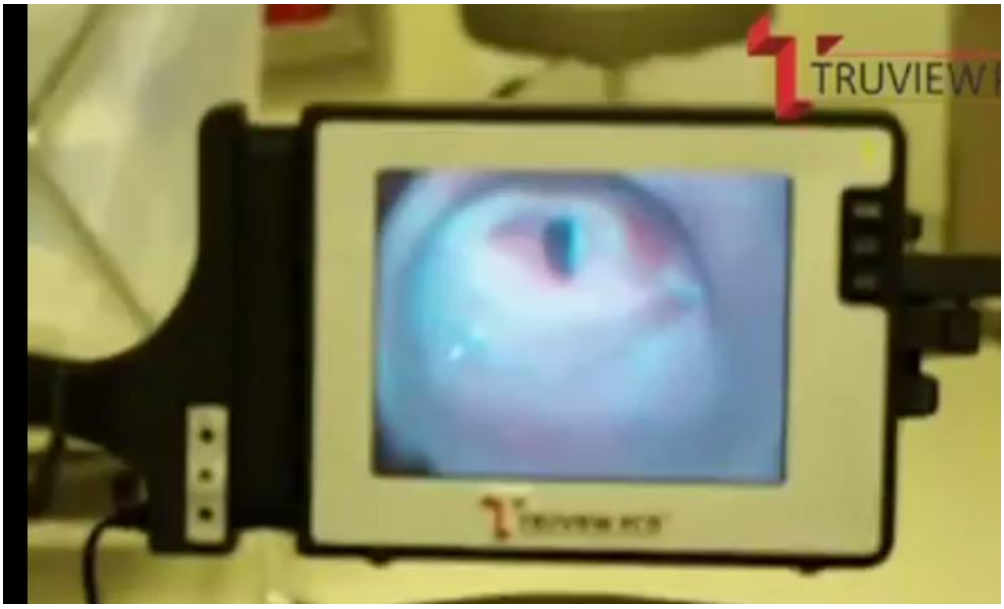
Truview PCD is a newly introduced Truphatek video laryngoscope. It is light weight and fairly portable. It is an improved version of Truview Evo2. It functions both as an optical and as a video laryngoscope. It is a small laryngoscope with optics and an eyepiece which provides a clear illuminated and magnified view of the larynx. A small dedicated camera is attached to the eyepiece with a magnetic source. It consists of stainless steel blades of size 0 to 4 which are reusable. These sizes cover from neonates to adults. The handle provides the light source. The blade has got an optical view tube with prismatic lens at the distal tip. The eyepiece can be adjusted for fine tuning. There is a separate port for oxygen insufflation which serves as an anti-fogging element to the lens and also it prevents the desaturation occurring during the intubation period[7].

Truview Laryngoscope set

Truview LCD Monitor

Truview Handle with blade

The distal lens is a prism with 42 degrees of anterior refraction. The obtained image is magnified by the proximal lens. Preformed metal stylets are provided by the manufacturer.



Larngoscopic View

Blade Dimensions					
Blade Size	Blade Dimensions in millimeters		Recommended Patient's Age	Recommended Weight Range	
	Length	Width	In years	Kilograms	Pounds
Size 0	75	11	1<	0.8-4	2-9
Size 1	92	12	1-3	4-8	9-18
Size 2	123	20	2-16	8-60	18-132
Size 3	129	22	>16	50-120	110-265
Size 4	143	24	>16	>120	>265

Table showing Blade Dimensions

REVIEW OF LITERATURE

1.Vlatten, et al[1].,

They compared the storz video laryngoscope with standard direct laryngoscope for intubating the paediatric airway. The study population were 56 children of ASA class I and II who were scheduled for elective surgeries. They were randomly divided into two groups, one group intubated using direct Macintosh laryngoscope, other group intubated using storz video laryngoscope. Time to best view (TTBV), Time taken to intubate (TTI), Cormack Lehane grading (CLG), POGO scoring were recorded. TTBV with Direct Laryngoscopy was 4-8 sec (5.5 sec mean), 4.2-9 sec(7 sec mean) with video laryngoscope; TTI with direct laryngoscope 7-29 sec (mean of 21 sec); Video laryngoscope was 22-37 (mean 27 sec). Percentage of glottic opening was 100% with video laryngoscope whereas it was 97.5% (60 to 100%) in comparison with direct laryngoscope[1]; This study demonstrated that video laryngoscope provides better visualisation to the glottis in paediatrics but at the cost of longer time needed for intubation using the video laryngoscope[1].

2. David Macnair et al[2]

They compared the Berci Kaplan video laryngoscope and direct laryngoscope in paediatric airway. This study was conducted on 60 children of age 2-16 years[2]. They were randomly assigned into two groups. Video laryngoscope improved the Cormack Lehane grading of 2 to grade 1 in 8/11 grade 2 views (p -0.002). Median time of intubation were 16 sec for direct laryngoscope and 22 sec for video laryngoscope. This study concluded that video laryngoscope provides better visual quality than direct laryngoscope but at the expense of time taken for intubation[2].

3.Fiadjoe, John E et al[3]

They conducted a trial comparing the Glidescope video laryngoscope with direct Macintosh laryngoscope in neonates and infants, sixty children were included in the study and assigned to two groups; There was significant difference in the endotracheal tube passage time through trachea with Glidescope VL (P-0.007) , mean for Glidescope was 14.3 sec; for direct it

was 8.5 sec[3]. POGO scoring improved with Glidescope laryngoscope ($p<0.001$) median for Glidescope video laryngoscope was 100% ; for direct laryngoscope it was 80%. This study concluded that Glidescope results in faster time to best visualization but longer time to pass Endotracheal tube through trachea.

4. Michelle White, Nicola Weale et al[4]

They did a study to compare the cobalt video laryngoscope with conventional standard laryngoscope in simulated paediatric airways. They performed a randomized study of 32 paediatric anaesthetists to compare cobalt video laryngoscope scope with Miller laryngoscope. They found no difference in the intubation time between the two study groups. (29.3 sec in video laryngoscope versus 26.2 sec in standard direct laryngoscopy) p value=0.36; and also found no significance in the field of view (69% to 63%)[4]

5. Ricardio Riveros , Daniel l. sessler et al[5]

They compared the video laryngoscopes (both Truveiew and Glidescope) with direct standard laryngoscope in paediatric patients undergoing elective surgeries. They conducted this study on 134 paediatric population (neonate to 10 years) of age, American society of anaesthesiologists physical status I-III posted for posted for general surgeries. They were randomized to intubation using Glidescope or Direct or Truview laryngoscope. Then the Cormack Lehane scaling were recorded. Time taken to intubate and the number of attempts were noted. The Cormack Lehane scores obtained using Truview ($p=0.18$) and Glidescope ($p>0.99$) were not superior to the CL scores obtained with Standard direct laryngoscopy[5]. The median time to intubate were 39 sec (31-59 sec) with Glidescope, 44 sec (28-62 sec) with Truview, 23sec(21-28 sec) with direct laryngoscope. They concluded that the Cormack Lehane views by using the video laryngoscopes (Glidescope and Truview) were not superior to direct laryngoscope.

6. E. Abraham et al[6]

They did a study to compare the Glidescope and Miller laryngoscope with respect to percentage of glottis opening scores in the paediatric airway. The study population were 50 Paediatric patients. (age 6 months to 4 years) undergoing elective surgeries under general anaesthesia of ASA classI and II . POGO scores were determined using concordance coefficient of Lins(ccc). The mean pogo values for Miller blade were 84.8 sec and 92.8 sec for the Glidescope respectively. The coefficient value as per concordance coefficient correlation was 0.69 (95% CI-0.50, 0.86; p> 0.001). They suggested that glottis opening while using Glidescope is similar when compared to the opening seen in Miller Laryngoscope. This study mainly used the POGO scoring which is amount of glottis opening seen from inter arytenoid area to the anterior commissure as 100%, 0% if none of the glottis is seen. This also suggests that clinician can also use Glidescope video laryngoscope for Paediatric intubation since the Glottis view in Glidescope is comparable to the view in direct laryngoscopy[6].

7. Karsli et al[8]

They did a pilot study to compare the Glidescope laryngoscope and standard direct laryngoscope in Paediatric patients having difficult airways. The study population were 18 children (2 to 16 years) with history of difficult airway or history of failed intubation in the past. They recorded the best views in each method of laryngoscopy with or without BURP and the time to get the best view of larynx in each laryngoscope. They observed the statistical significance in viewing the larynx (Cormack Lehane grading) using the Glidescope (p =0.003) with BURP and (p=0.004) without BURP when compared with direct laryngoscope[8]. There was no significant statistical difference in the time taken for best views of the larynx in using Glidescope(mean 22 sec) over direct laryngoscope.(mean 20 sec); p=0.05. They concluded that the Glidescope improves the laryngeal view significantly in children with history of difficult airway.

8. Simon C et al

They evaluated a cohort study of the truview PCD in paediatric endotracheal intubation in 83 children of age (1 – 16 years) belonging to ASA class I-II who were undergoing elective surgeries under general anaesthesia. They recorded the number of attempts, Time needed for best views of glottis, Cormack lehane Grading ; easiness of glottis vision and intubation with liker scale; seventy nine individuals required first attempt, four needed second attempt; Time needed for best views was 10.8 sec mean ; Time needed for intubation was 33.4 sec mean with no other complications. Intubation time was similar in comparison with the time needed in other types of video Laryngoscopes. They concluded that Truview is a good device for intubating the normal paediatric airway with good glottis vision and similar intubation time as compared to other video laryngoscopes.

9.Kim JT et al[10]

They did a randomized trial comparing the use of Glidescope laryngoscope with direct laryngoscope in paediatric population. The study population was 203 children who were randomly assigned into two groups .

Group I - intubation using direct laryngoscopy

Group II - intubation using Glidescope

The laryngoscopic views were noted as per the Cormack-Lehane grading in both the groups. They observed that Glidescope (Group II) improved the glottis view in CL grades II ($p<0.01$) and with CL grades 3&4 ($p<0.04$)[10]. The mean time to intubate was 36 sec in Group II(Glidescope) and 13 sec in Group I (Direct laryngoscope).

They concluded that Glidescope provided better laryngeal view in children than direct laryngoscopy but at the cost of longer time for intubation[10].

10.Karademir F et al[9]

They conducted a study to compare the intubation time in using Glidescope laryngoscope and standard direct laryngoscope in paediatric population. 60 children of age less than 10 years belonging to ASA class I-III were included in this study. They were randomly assigned into two groups, Group I intubated using Video laryngoscope whereas Group II using Direct laryngoscope. They noted the intubation time in both the groups. They observed that the intubation time Group I-(14 +/- 5 sec) Group II-(13 +/- 5 sec) was not statistically significant in both these groups[9]. They concluded that Glidescope is equally suitable for endotracheal intubation in paediatrics when compared with direct laryngoscope in regards to intubating time.

11.Rabiner E et al[12]

They did a study in comparing the performance of novice clinicians in using the Glidescope and direct laryngoscope in a paediatric simulator. 25 interns were included in the study population. They recorded the intubation time and number of intubation attempts in both the devices obtained from the interns,

They observed that in normal airway there was no significant difference in the mean intubation time (67.4 sec in GL versus 61.4 sec in DL). But in difficult airway scenario they took more time to intubate with Glidescope (mean 81.3 sec) than with direct laryngoscope (mean 67.5 sec)[12]. They concluded that Glidescope does not improve intubation time in normal and difficult airways in paediatric simulators in the hands of novice clinicians.

12. Fonte M et al[11]

They did a study in comparing the efficacy of Glidescope laryngoscope and standard direct laryngoscope among paediatric residents in patient simulators. Four scenarios were proposed among 16 paediatric residents. Normal airway, tongue oedema, pharyngeal oedema, and cervical collar were the simulation models. Mean (SD) time taken for intubation was significantly more with GlideScope in the normal airway group GlideScope (38 [SD, 13] vs (Miller, 26 [SD, 16])secs; P =0.043)[11].

Number of maneuvers needed to intubate was higher with GlideScope in tongue and pharyngeal oedema group (2.3 vs 1.5) (P value 0.04)

They observed that GlideScope did not improve performance of intubation when compared with direct standard laryngoscope. GlideScope may be safer and may have advantages in the difficult airway scenarios[11].

13. Anez et al

They did a cohort evaluation on paediatric population using the Truview PCD laryngoscope. The study population were eighty three children between 1-16 years of age belonging to ASA class I-III undergoing ENT or general surgeries under General anaesthesia. Time taken for best glottic views; Time taken for intubation; Number of intubation attempts and easiness to intubate were recorded. They concluded that Truview is a good option in paediatrics by having the almost similar intubation time when compared with other channelled video laryngoscope in paediatrics.

MATERIALS AND METHODS

DESIGN OF THE STUDY

This study was a prospective, randomised, single blinded (subject), case control study conducted in Institute of Child Health and Research Centre, Egmore, Chennai.

STUDY SETTING AND POPULATION:

After obtaining Institutional Ethics committee clearance and approval, sixty ASA I-II paediatric patients undergoing elective surgeries under general anaesthesia were enrolled for the study. The introduction of devices, procedures, collection of data was done by the author.

PATIENT SELECTION

INCLUSION CRITERIA:

Age : 1-12 Years

ASA PS : I, II

Surgery : Elective

Who have given valid informed consent .

EXCLUSION CRITERIA

Not satisfying inclusion criteria.

Patients posted for emergency surgeries.

Lack of informed consent.

Intubated prior to surgery.

Are unconscious or severely ill.

Need for nasal intubation.

MATERIALS

Macintosh laryngoscope

Truview PCD laryngoscope

Stop watch

Basic Monitors (NIBP, ECG, Saturation monitor)

AIRWAY ASSESSMENT IN PAEDIATRICS[13,15]

Evaluating and assessing the paediatric airway can be challenging. Airway assessment begins with a comprehensive history and physical examination as in case of adults.

A detailed history especially pertaining to airway was recorded.

Previous anaesthesia records, H/O mouth breathing, snoring, recurrent respiratory infections, reactive airway disease, prior radiation history were recorded[13].

General examination should focus on the anomalies of head& neck, face, spine.

Evaluation of shape and size of the head, facial features, mandibular size and symmetry ,tongue size, palate shape and pathology, prominence of tooth especially upper incisors, range of motion of head and neck, jaw.

Signs of airway obstruction should be sought such as suprasternal/sternal/infrasternal/intercostal retractions.

Obtaining oxygen saturation is important for determining the patient's ability to compensate for airway issues.

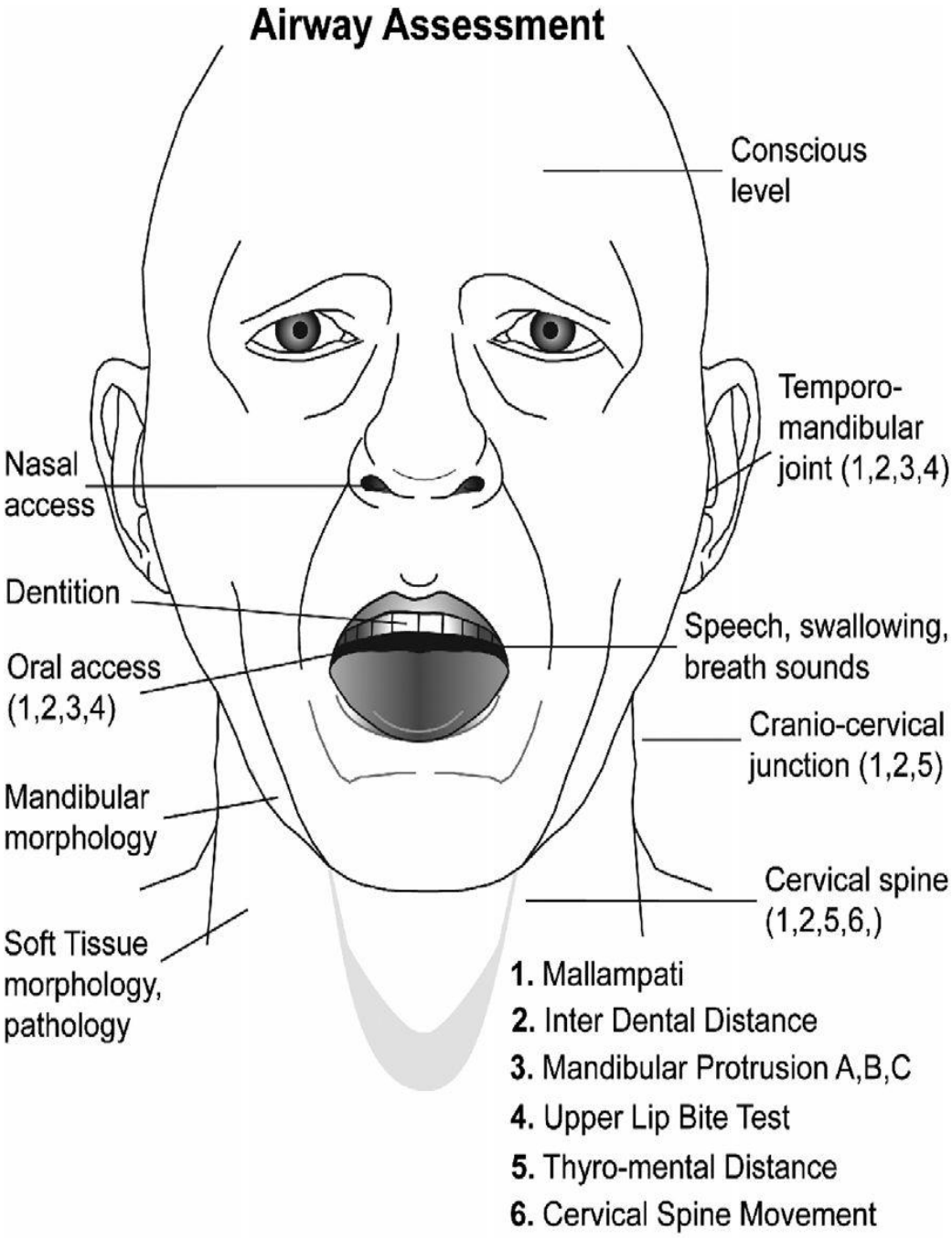
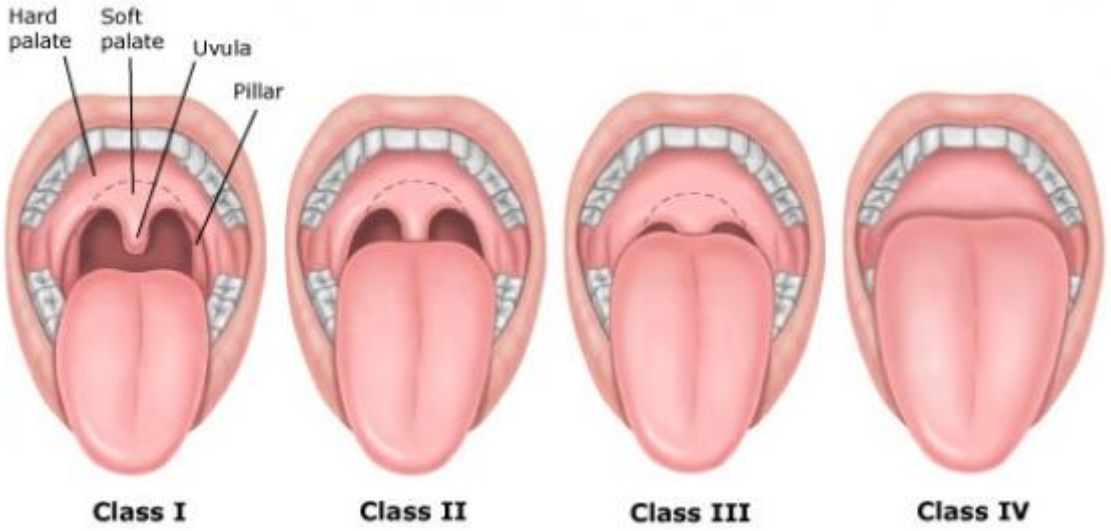


Figure showing Airway Assessment Points

There are no definitive criteria or guidelines for assessment of paediatric airway since many of the airway examination tools done in adults cannot be performed in children. Airway assessment is usually difficult in children, especially in less than 3 years of age since most of the tests performed in adults require patient cooperation.

Samsoon and Young modification of Mallampati Class:

Size of tongue relative to oropharynx is determined by Mallampati classification. This can be done in older children. The patient kept in sitting position with maximal mouth opening, protruding the tongue out, without phonation and the observer's eye in level with patients mouth the degree to which faucial pillars, uvula, soft palate and hard palate were visible were recorded and classified as follows;

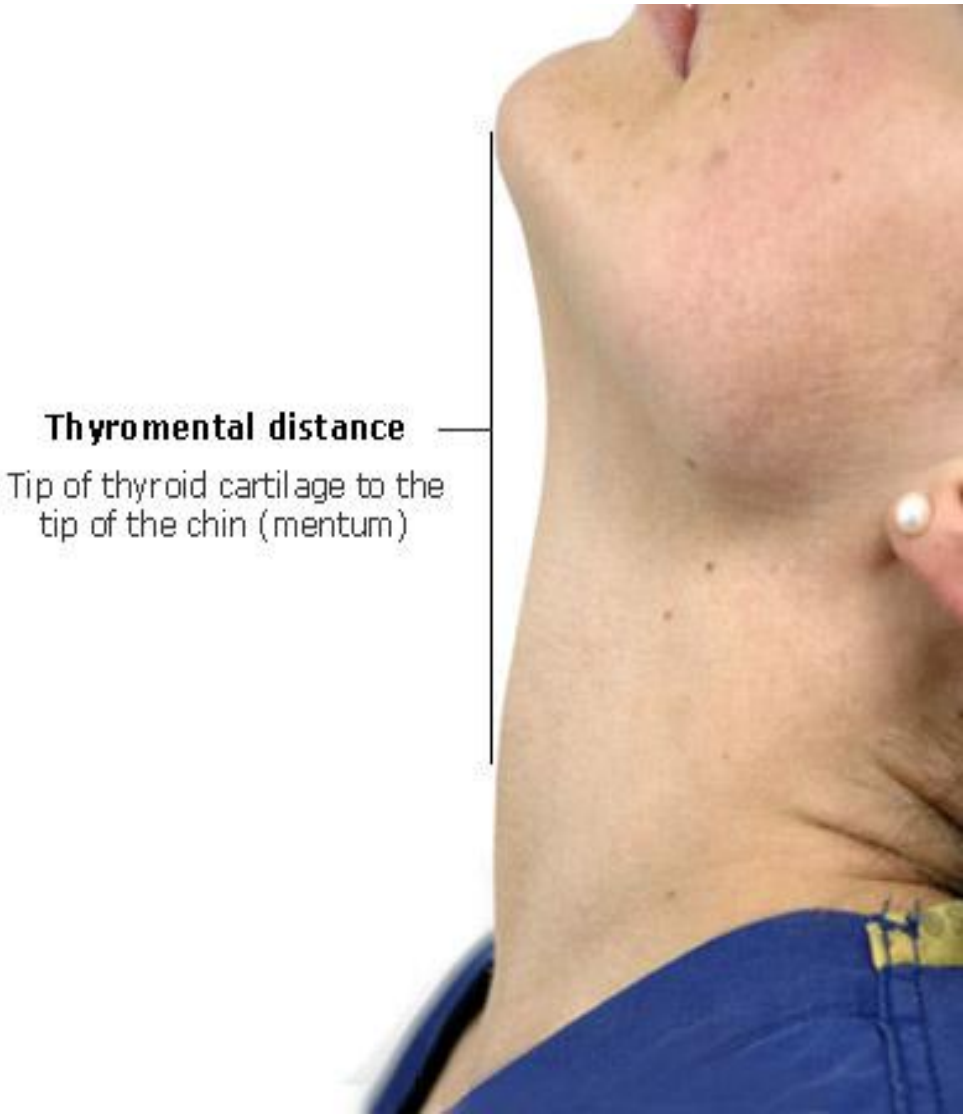


Class-I	Faucial pillars,uvula,soft palate &hard palate.
Class-II	Uvula,soft palate&hard palate visible.
Class-III	base of uvula or none, soft palate& hard palate visible.
Class-IV	only hard palate is visible.

Inter-incisor distance (IID):

The distance between the incisors is measured to assess the adequacy of mouth opening for introduction of laryngoscope blade. If it is >3 cms it indicates the easiness of insertion of laryngoscope blade.

Thyromental Distance (TMD):



Also called as Patil's test.

The distance between the thyroid notch and the symphysis menti when the neck is in full extension and mouth closed. This determines how easily the pharyngeal and laryngeal axis fall in line when the atlanto occipital joint is extended.

Hyomental Distance:

If 3 fingers in adolescents, 2 fingers in children, and one finger in infants can be placed between the mandibular symphysis or chin and the hyoid bone (potential displacement area) adequate glottis visualisation will be successful. If the area is too small then extensive extension of the neck will result only in anterior shift of larynx.

Best Oropharyngeal View (BOV)

This can be performed in older children. The patient positioning is almost similar to the position for MMP grading without tongue protrusion.

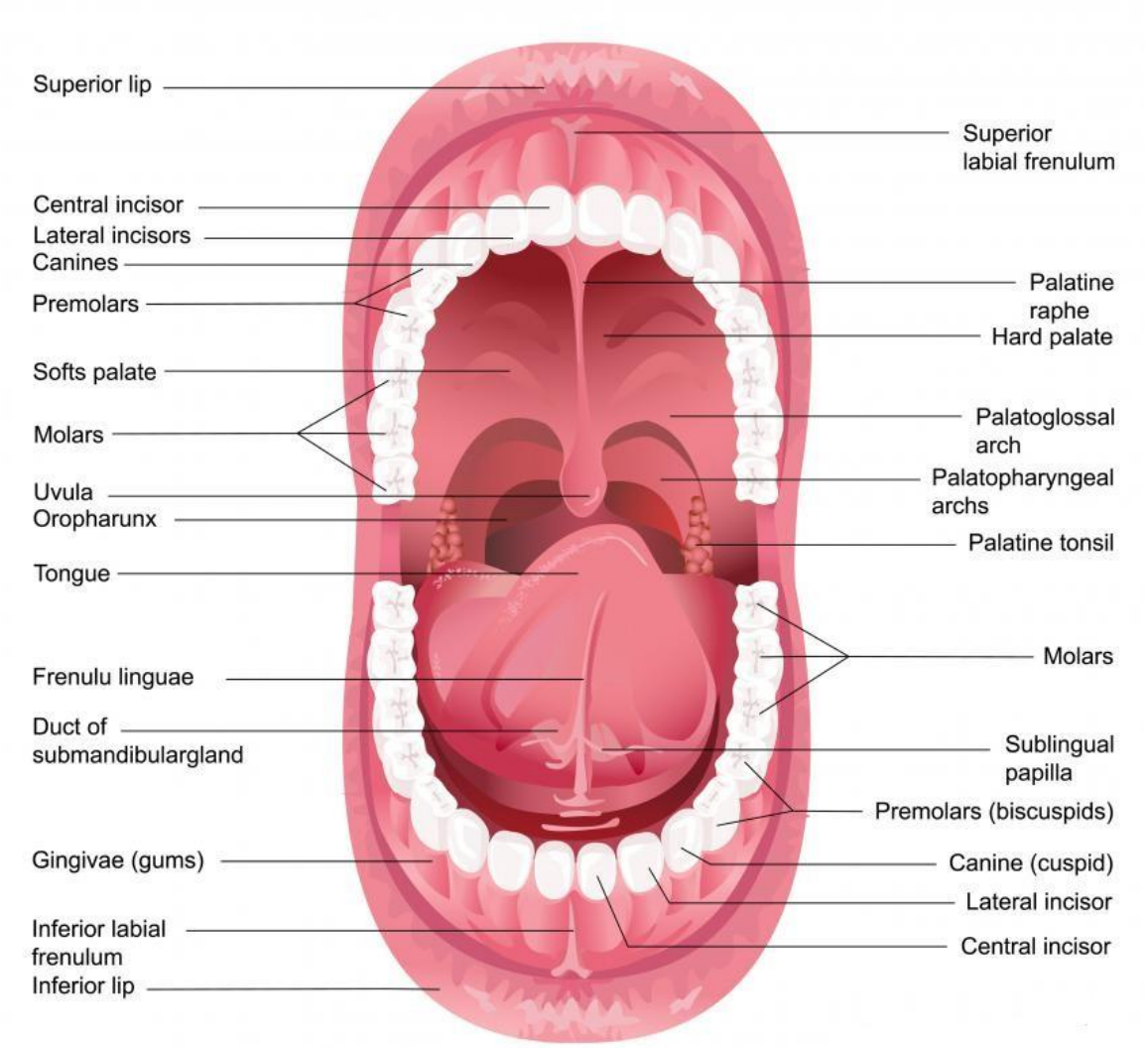


Figure showing Oropharyngeal view

COPUR SCALE

Lane et al(2005)

Formulated a simple and rapid way of assessing the airway in paediatric population named as COPUR scale.

C - CHIN

O - Opening of mouth (interdental space)

P – **P**revious intubation or OSA

U – **U**vula

R - **R**ange of motion

Each variable has got the scores from 1 to 4. So total score is 20. Values above 10 predicts difficult airway.

METHODOLOGY

After obtaining the proper informed written consent from the parent or guardian of the children, patients shifted into the operating room. A thorough pre anaesthetic evaluation was conducted including detailed history and airway examination based on the above discussed parameters.

The patients were randomly assigned into 2 groups viz

Group I - Video Laryngoscope

Group II - Direct Laryngoscope

In the operating room, standard basic monitoring devices were applied to the patient including a Pulse oximetry, 3 lead ECG, Non invasive blood pressure monitor. Baseline measures of NIBP, heart rate and saturation were recorded. Intra venous access obtained. Video laryngoscope checked for battery power and external monitor is being attached to the eyepiece of the scope through magnetic camera adapter. Appropriate size endotracheal tube for the patient is selected. The tube is lubricated with a water soluble jelly and optical preformed

metal stylet has been introduced into the appropriate endotracheal tube.

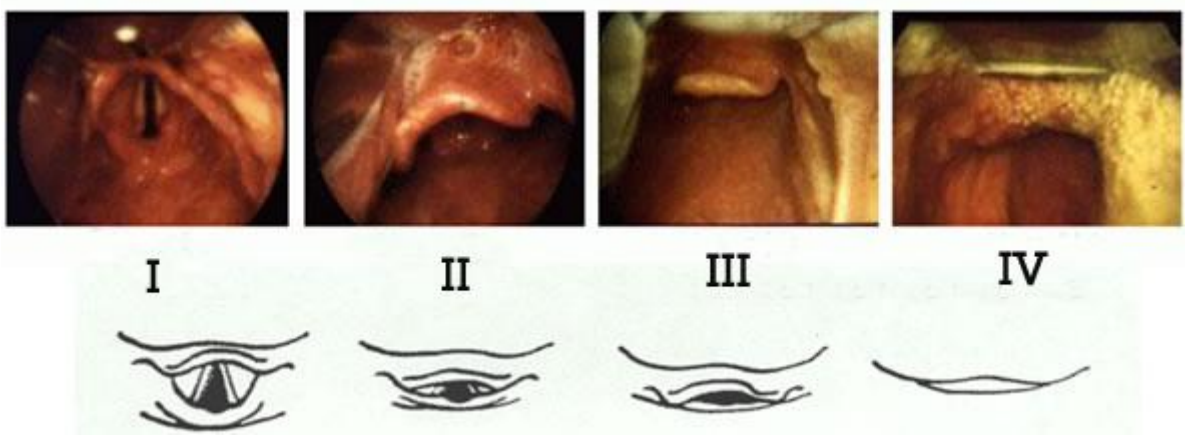
Inj.atropine 0.02 mg/kg and fentanyl 2 mics/kg given as premedication. Then preoxygenated with 100% oxygen for 3 minutes.

Induction done with Inj propofol 2mg/kg + NDP neuromuscular blocker inj. Atracurium 0.5 mg/kg. Ventilated with bag and mask with sevoflurane 2% and oxygen for 3 minutes. Then oxygen port in the laryngoscope has been connected with a tubing to the common gas outlet of the anaesthesia machine. After optimal positioning, the video laryngoscopy has been done with the blade being introduced in the midline without tongue lateralisation. Then the monitor is being visualised for glottis.

Figure showing Video laryngoscope being introduced

Time taken for best visualisation of the larynx is being recorded with the stop watch by the first assistant. Cormack-Lehane grading was noted.

CORMACK – LEHANE GRADING[14,16]



GRADE I **Entire laryngeal aperture is visualized.**

GRADE II **Only the posterior portion of the laryngeal aperture is visualized**

GRADE III **Only the epiglottis**

GRADE IV **Only the soft palate. No glottis structures seen.**

Time needed for intubation (measured from entry of scope into the oral cavity until confirmation of proper placement of endotracheal tube) was noted.

If the intubation attempt with video laryngoscope failed and saturation maintained Macintosh blade used for intubation and if the saturation decreased mask ventilation with 100% oxygen followed by intubation with Macintosh laryngoscope. The recorded variables are

- Time Taken to Best View (TTBV)
- Time Taken to Intubate(TTI)
- Cormack-Lehane grading.
- Number of Attempts.

The data were collected for both the study groups.

OBSERVATION AND RESULTS

This study was conducted in sixty children of ASA PS I-II class who underwent elective surgical procedures. It was ensured that they had fulfilled the inclusion criteria and exclusion criteria as mentioned in the chapter materials and methods.

The data was analysed using the SPSS software version 16.1.

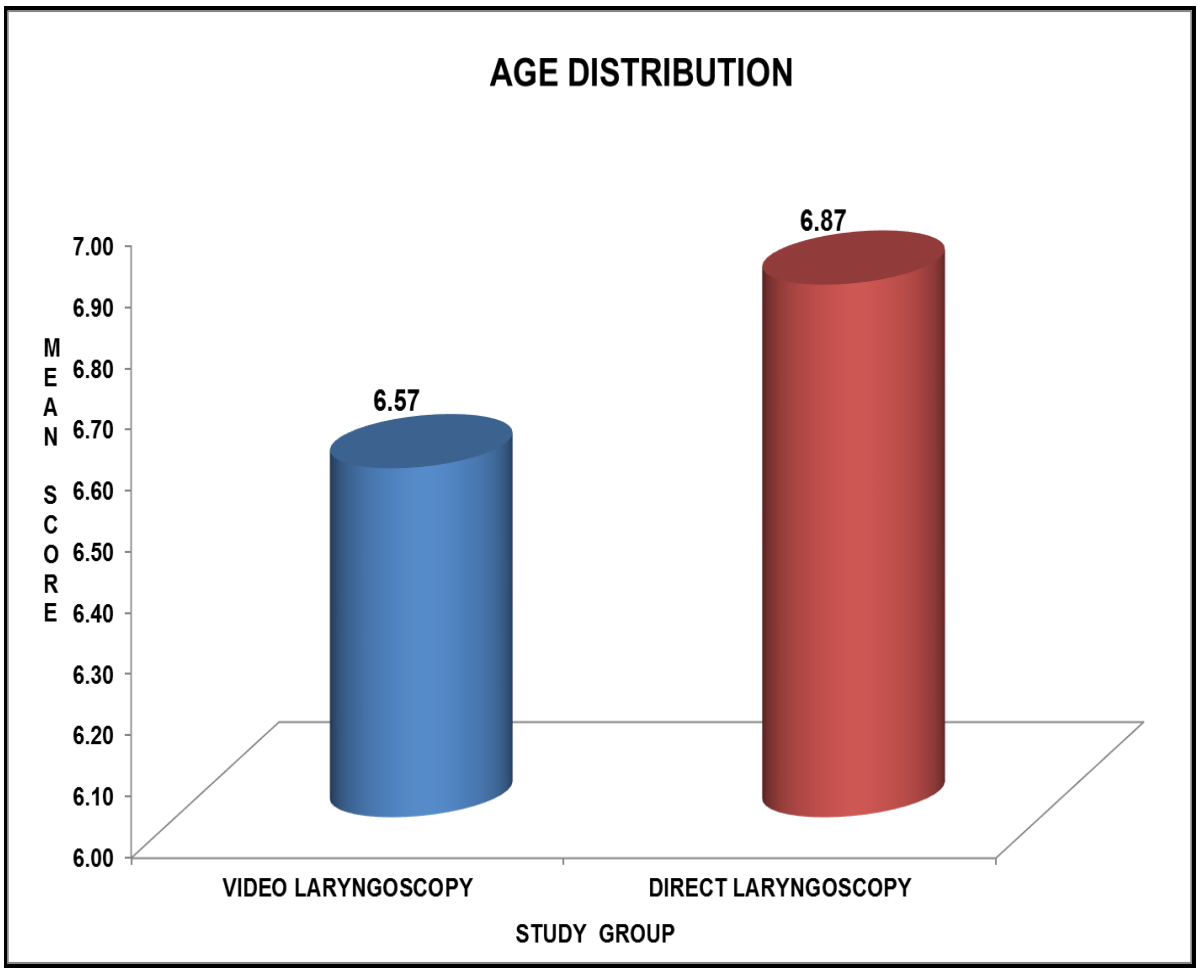
The ‘p’ value less than 0.05 was taken as significant.

Demographic Characteristics

The two groups were comparable to the demographic variables such as age, sex distribution.

Mean Age (in Years)

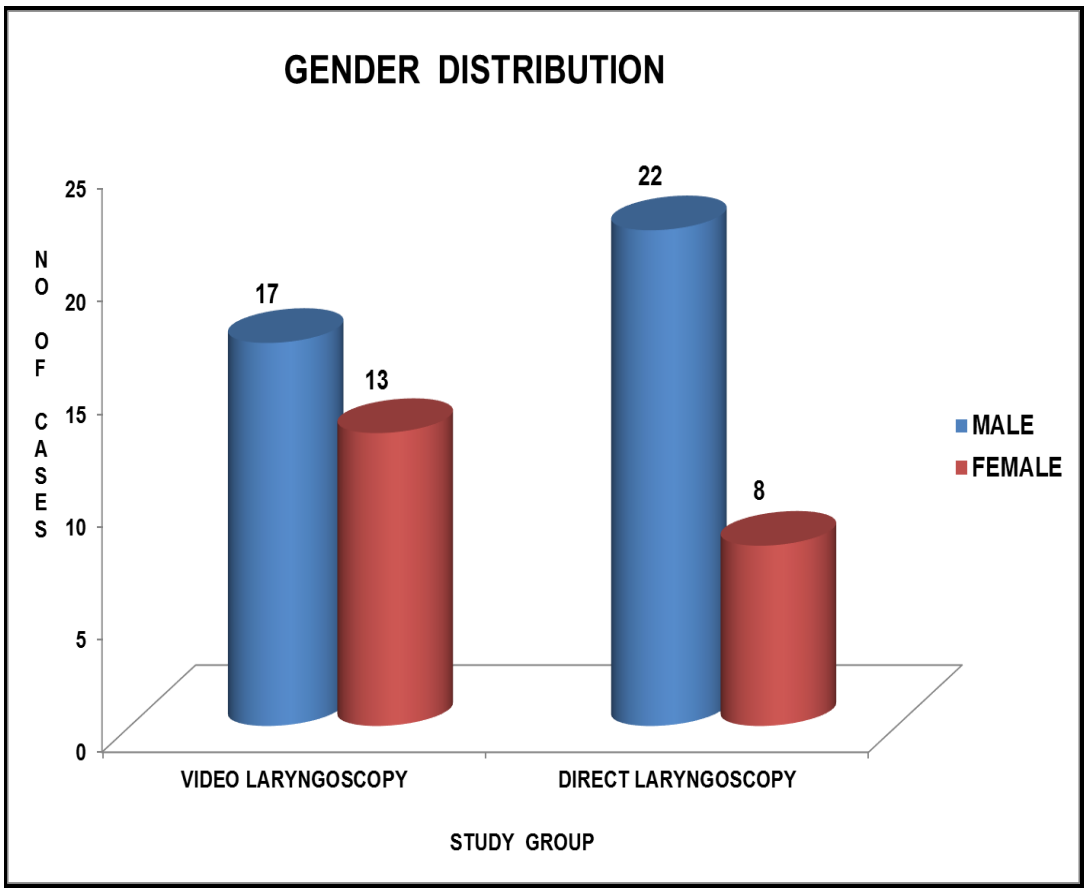
Group	Mean	Standard Deviation
VIDEO LARYNGOSCOPY	6.57	2.92
DIRECT LARYNGOSCOPY	6.87	3.68
t-value	0.35	
p-value	0.73	
Significant	**Not Significant**	



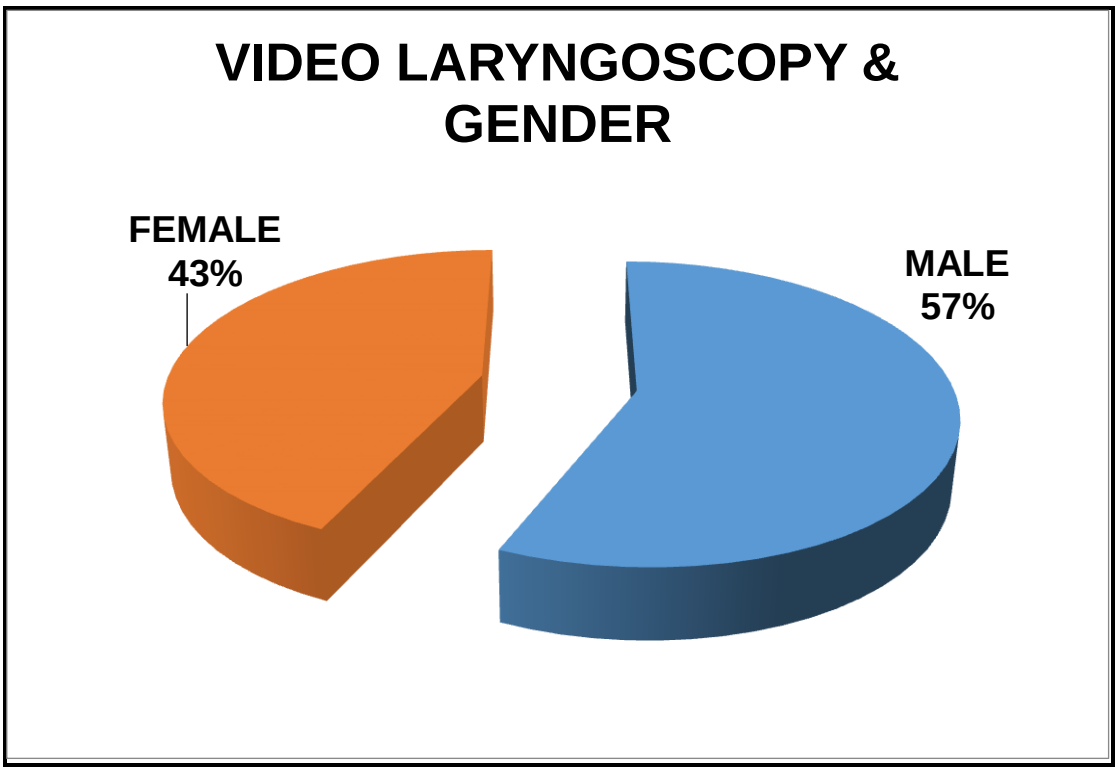
There was no statistical significance in comparing the demographic Variables age, sex distribution between the two study groups.

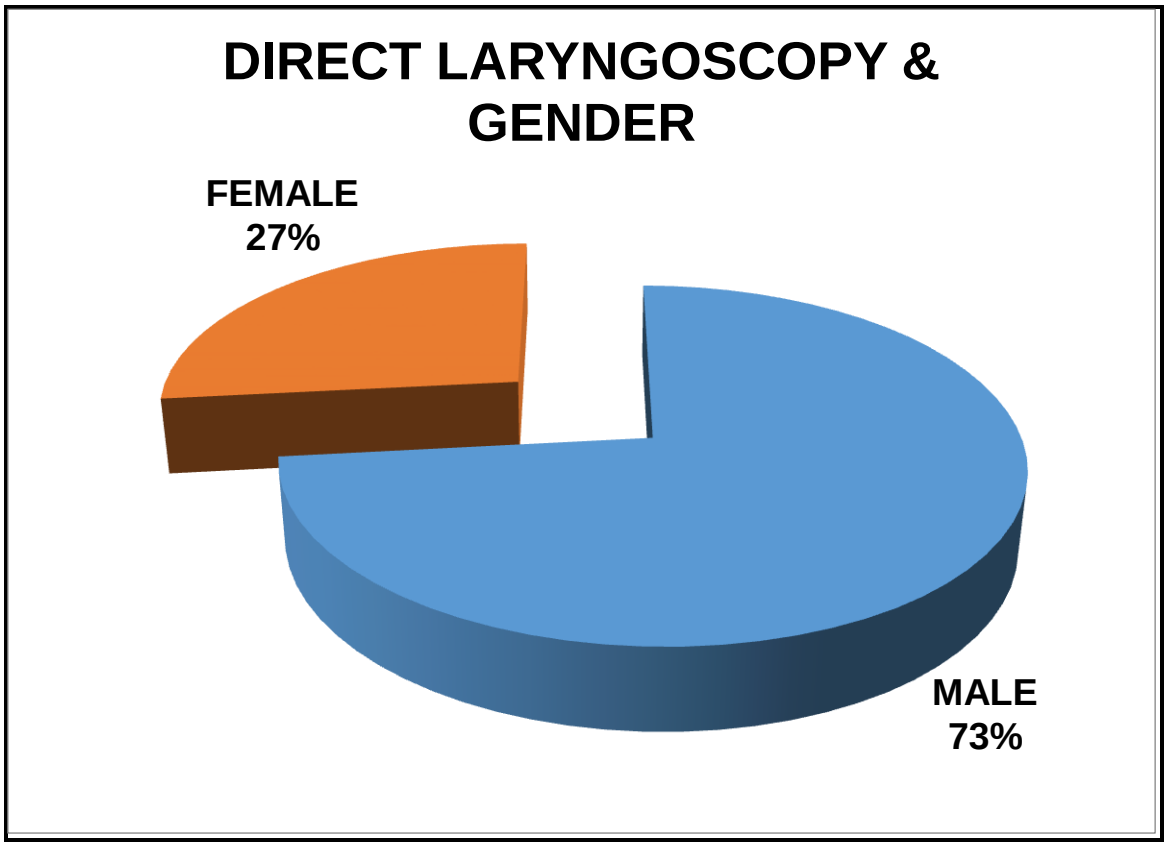
GENDER DISTRIBUTION

Sex	VIDEO LARYNGOSCOPY		DIRECT LARYNGOSCOPY	
	No of Patients (N)	Percentage (%)	No of Patients (N)	Percentage (%)
Male	17	56.67	22	73.33
Female	13	43.33	8	26.67
Total	30	100	30	100
Chi square	1.83			
p-value	0.18			
Significant	**Not Significant**			
Sex Ratio	57 : 43		73.: 27	



GENDER DISTRIBUTION





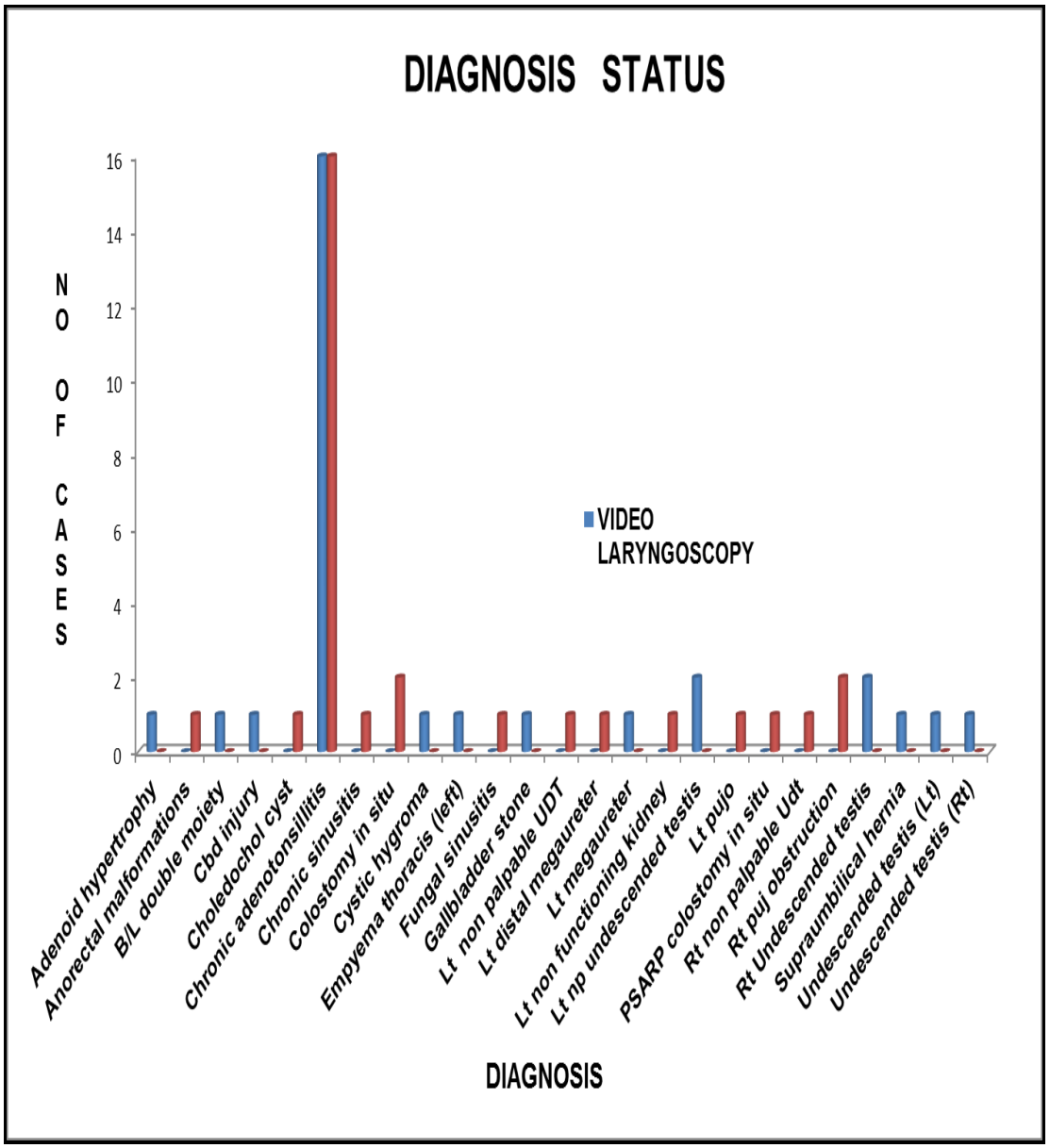
GENDER AND LARYNGOSCOPY

DIAGNOSIS

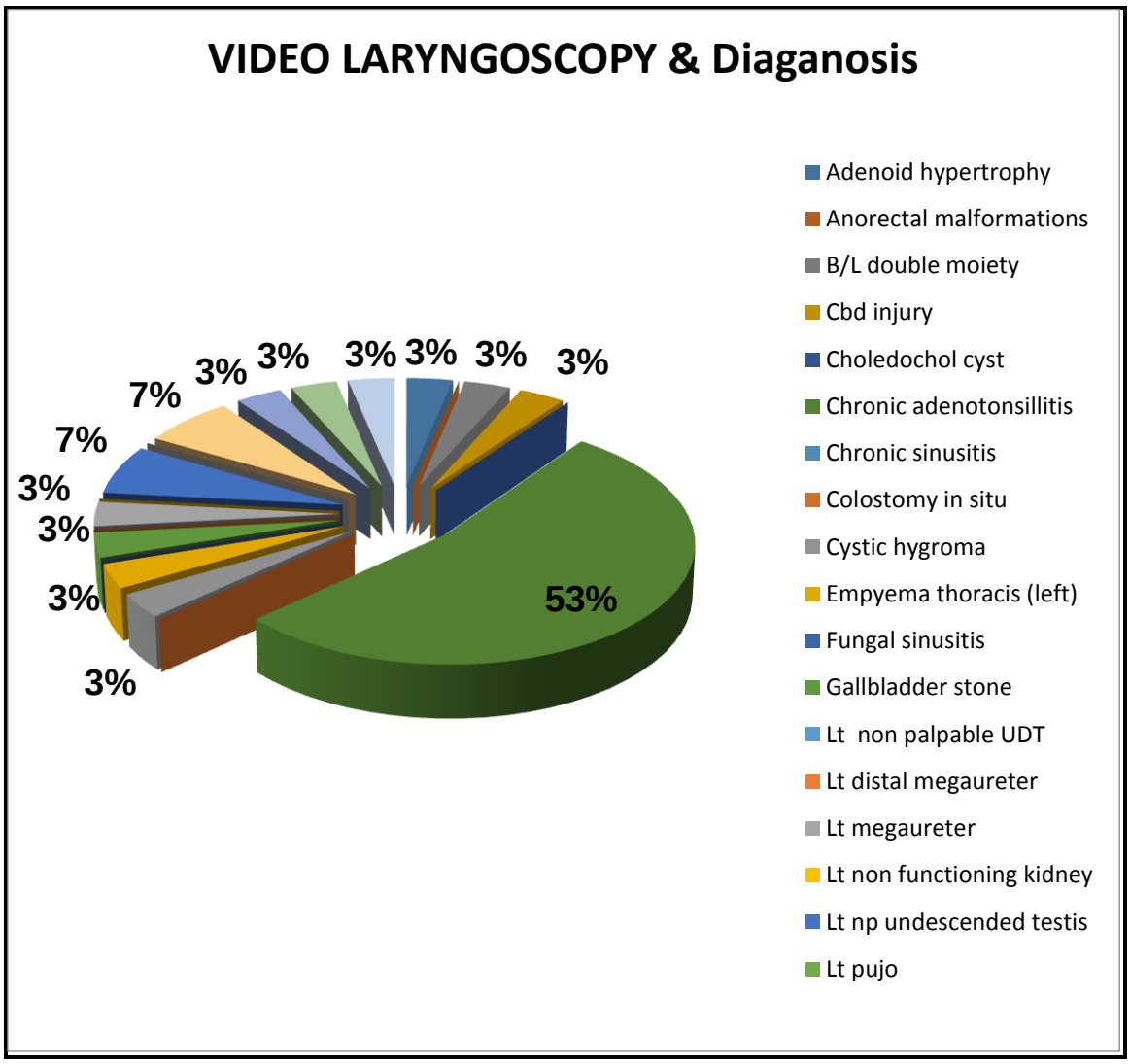
Diagnosis	VIDEO LARYNGOSCOPY		DIRECT LARYNGOSCOPY	
	No of Patients (N)	Percentage (%)	No of Patients (N)	Percentage (%)
Adenoid hypertrophy	1	3.33	0	0
Anorectal malformations	0	0	1	3.33
B/L double moiety	1	3.33	0	0
cbd injury	1	3.33	0	0
choledochal cyst	0	0	1	3.33
chronic adenotonsillitis	16	53.34	16	53.33
chronic sinusitis	0	0	1	3.33
colostomy in situ	0	0	2	6.67
cystic hygroma	1	3.33	0	0
Empyema thoracis (left)	1	3.33	0	0
Fungal sinusitis	0	0	1	3.33
Gallbladder stone	1	3.33	0	0
Lt non palpable UDT	0	0	1	3.33
Lt distal megaureter	0	0	1	3.33
lt megaureter	1	3.33	0	0
Lt non functioning kidney	0	0	1	3.33

Diagnosis	VIDEO LARYNGOSCOPY		DIRECT LARYNGOSCOPY	
	No of Patients (N)	Percentage (%)	No of Patients (N)	Percentage (%)
lt np undescended testis	2	6.68	0	0
LT pujo	0	0	1	3.33
PSARP colostomy in situ	0	0	1	3.33
Rt non palpable Udt	0	0	1	3.33
rt puj obstruction	0	0	2	6.67
Rt Undescended testis	2	6.68	0	0
supraumbilical hernia	1	3.33	0	0
undescended testis (Lt)	1	3.33	0	0
undescended testis (Rt)	1	3.33	0	0
TOTAL	30	100	30	100
Chi square	28.00			
p-value	0.26			
Significant	Not Significant			

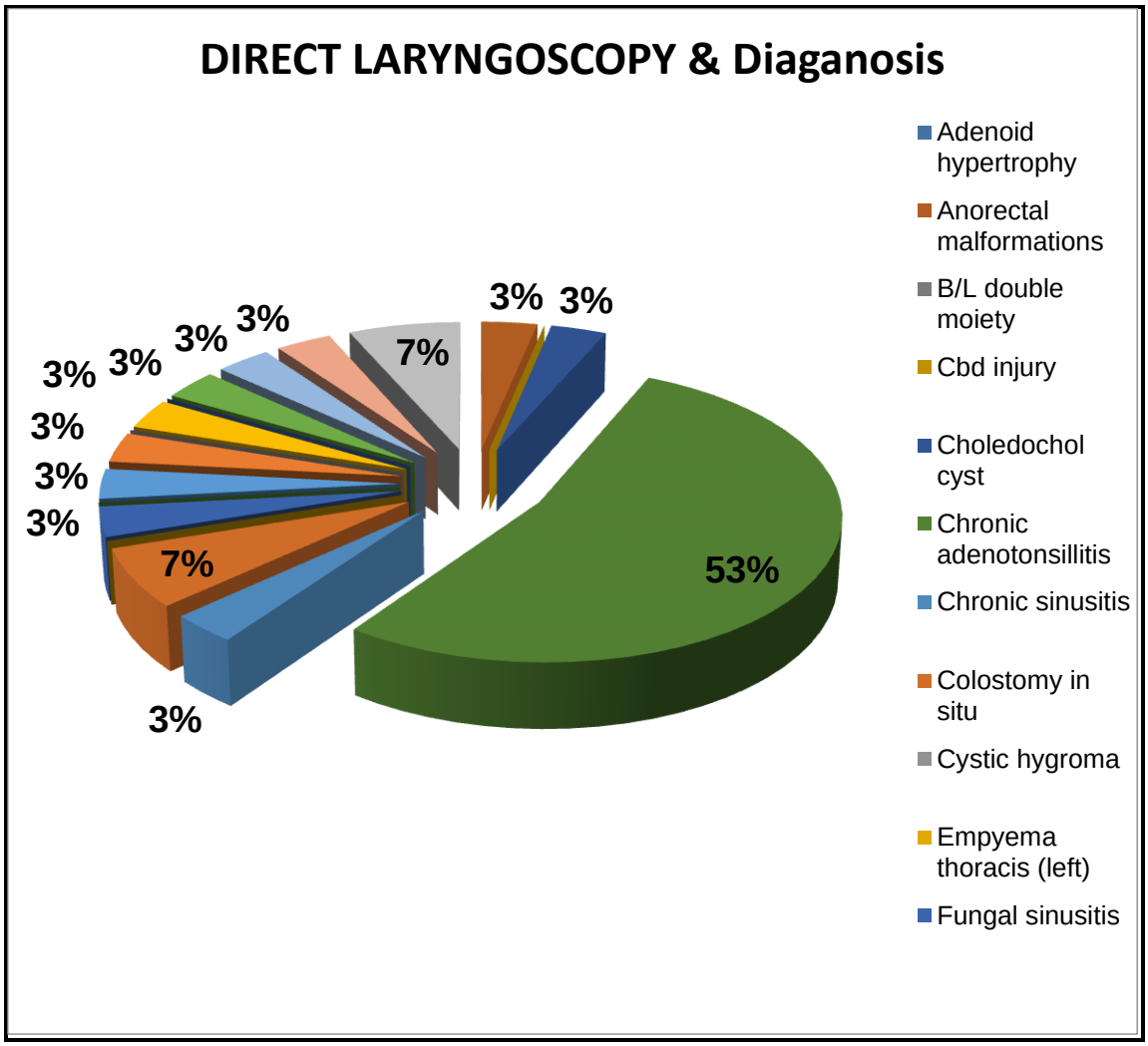
DIAGNOSIS


DIAGNOSIS STATUS
NO OF CASES
16
14
12
10
8
6
4
2
0
VIDEO LARYNGOSCOPY
Adenoid hypertrophy
Anorectal malformations
B/L double moiety
Cbd injury
Choledochol cyst
Chronic adenotonsillitis
Chronic sinusitis
Colostomy in situ
Cystic hygroma
Empyema thoracis (left)
Fungal sinusitis
Gallbladder stone
Lt non palpable UDT
Lt distal megaureter
Lt megaureter
Lt non functioning kidney
Lt np undescended testis
Lt pujo
PSARP colostomy in situ
Rt non palpable Udt
Rt puj obstruction
Rt Undescended testis
Supraumbilical hernia
Undescended testis (Lt)
Undescended testis (Rt)
DIAGNOSIS

VIDEO LARYNGOSCOPY AND DIGNOSIS



DIRECT LARYNGOSCOPY AND DIGNOSIS

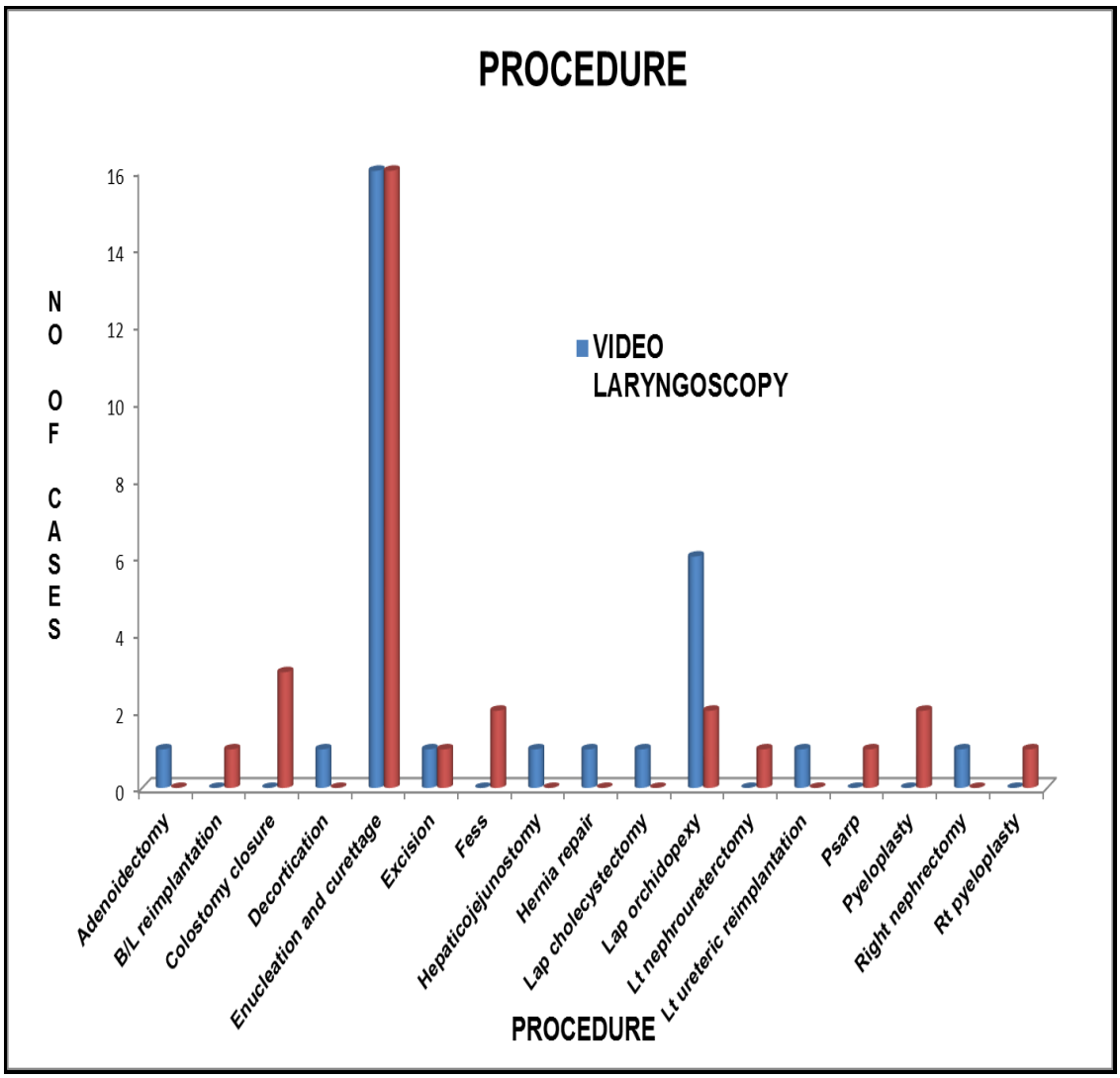


PROCEDURE

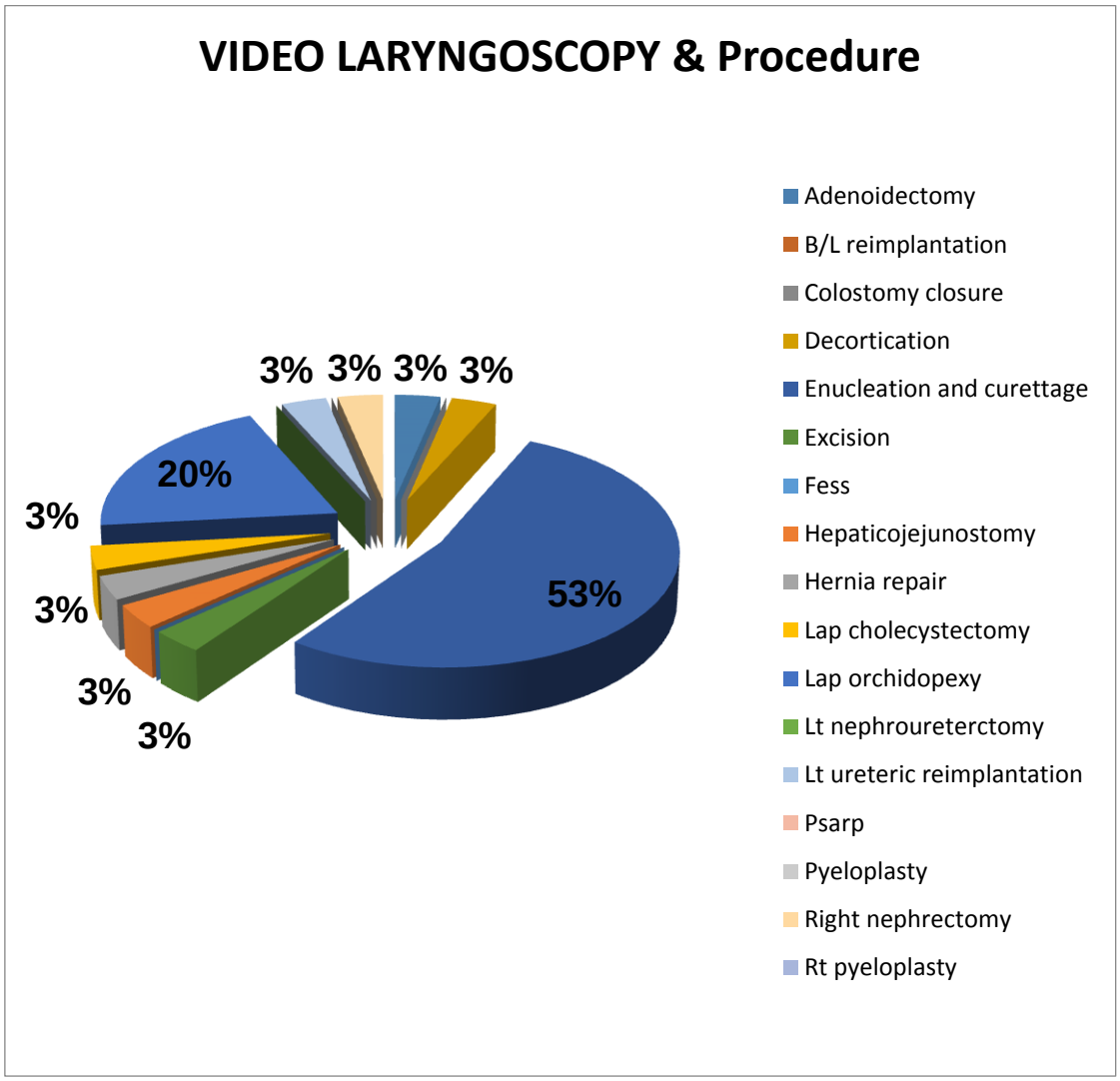
Procedure	Video Laryngoscopy		Direct Laryngoscopy	
	No of Patients (N)	Percentage (%)	No of Patients (N)	Percentage (%)
Adenoidectomy	1	3.30	0	0
B/L reimplantation	0	0	1	3.33
Colostomy closure	0	0	3	10.00
Decortication	1	3.33	0	0
Enucleation and curettage	16	53.34	16	53.34
Excision	1	3.33	1	3.33
Fess	0	0	2	6.68
Hepaticojejunostomy	1	3.33	0	0
Hernia repair	1	3.33	0	0
Lap cholecystectomy	1	3.33	0	0
Lap orchidopexy	6	20.00	2	6.68
Lt nephroureterctomy	0	0	1	3.33
Lt ureteric reimplantation	1	3.33	0	0
Psarp	0	0	1	3.33

Procedure	Video Laryngoscopy		Direct Laryngoscopy	
	No of Patients (N)	Percentage (%)	No of Patients (N)	Percentage (%)
Pyeloplasty	0	0	2	6.68
Right nephrectomy	1	3.33	0	0
Rt pyeloplasty	0	0	1	3.33
TOTAL	30	100	30	100
Chi square	21.03			
p-value	0.22			
Significant	**Not Significant**			

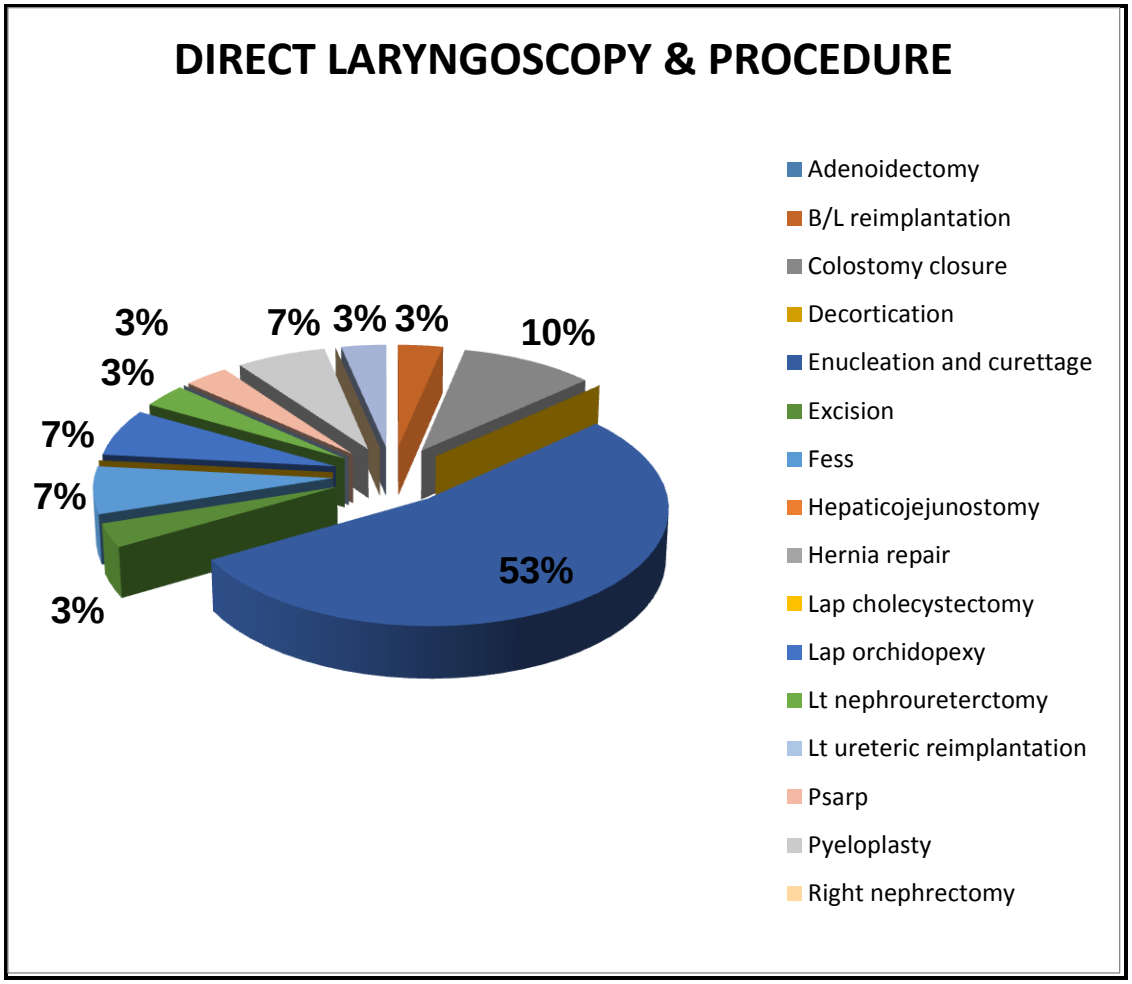
PROCEDURE


PROCEDURE
NO OF CASES
16
14
12
10
8
6
4
2
0
VIDEO LARYNGOSCOPY
Adenoidectomy
B/L reimplantation
Colostomy closure
Decortication
Enucleation and curettage
Excision
Fess
Hepaticojejunostomy
Hernia repair
Lap cholecystectomy
Lap orchidopexy
Lt nephroureterctomy
Lt ureteric reimplantation
Psarp
Pyeloplasty
Right nephrectomy
Rt pyeloplasty
PROCEDURE

VIDEO LARYNGOSCOPY AND PROCEDURE



DIRECT LARYNGOSCOPY AND PROCEDURE



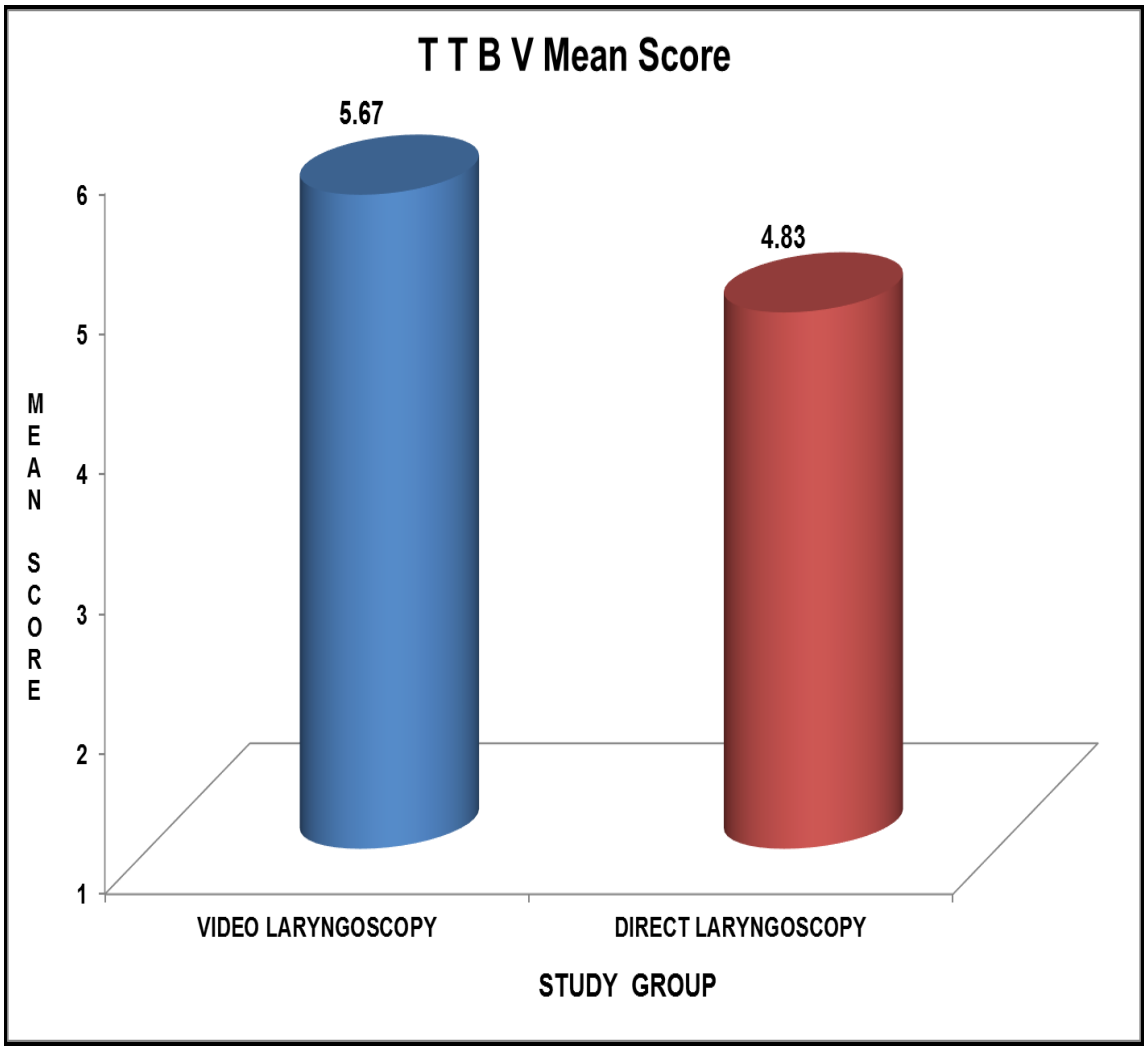
TTBV (sec)

Group	Mean	Standard Deviation
VIDEO LARYNGOSCOPY	5.67	1.12
DIRECT LARYNGOSCOPY	4.83	0.70
t-value	3.45	
p-value	0.001	
Significant	**Significant**	

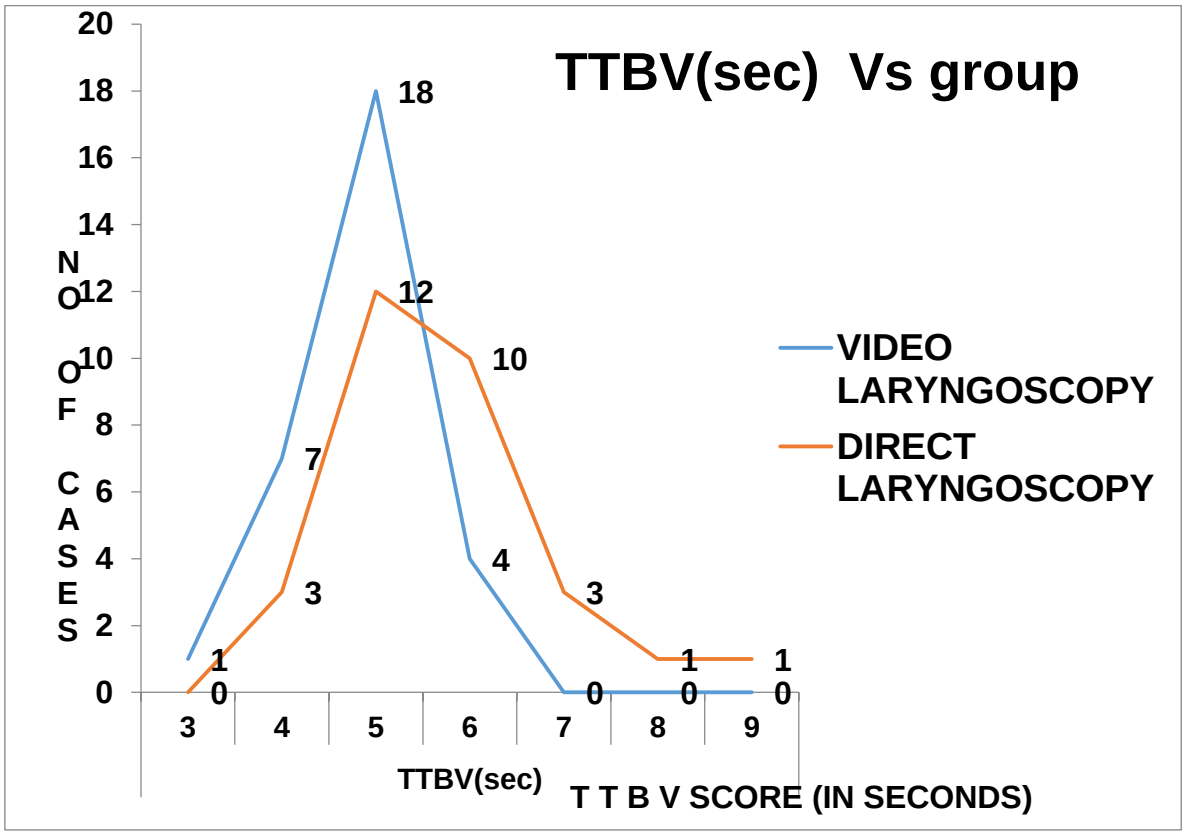
Mean time taken for best view of glottis were 5.67 sec (SD 1.12) and 4.83 sec (SD 0.70) for video and direct laryngoscopy respectively.

This shows statistical significance. (p = 0.001)

TTBV MEAN SCORE



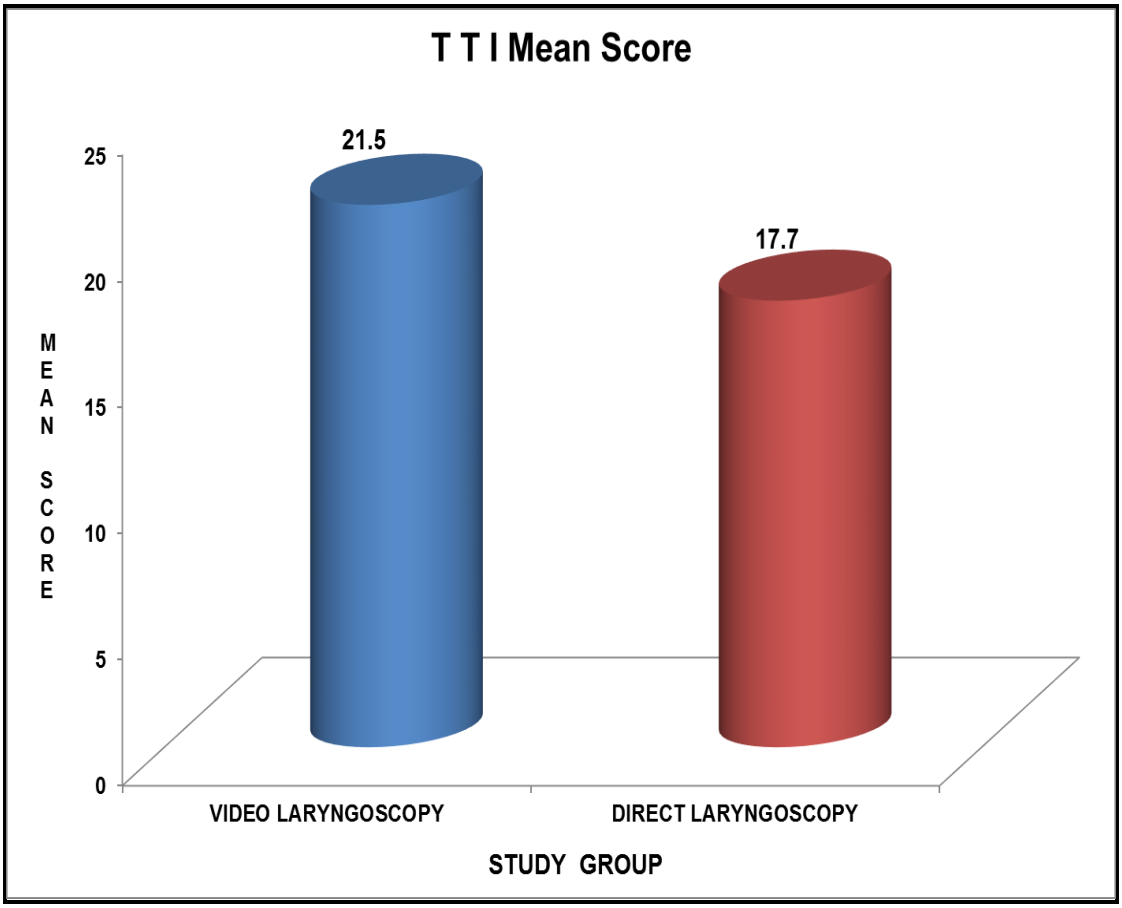
TTBV MEAN VERSUS STUDY GROUP

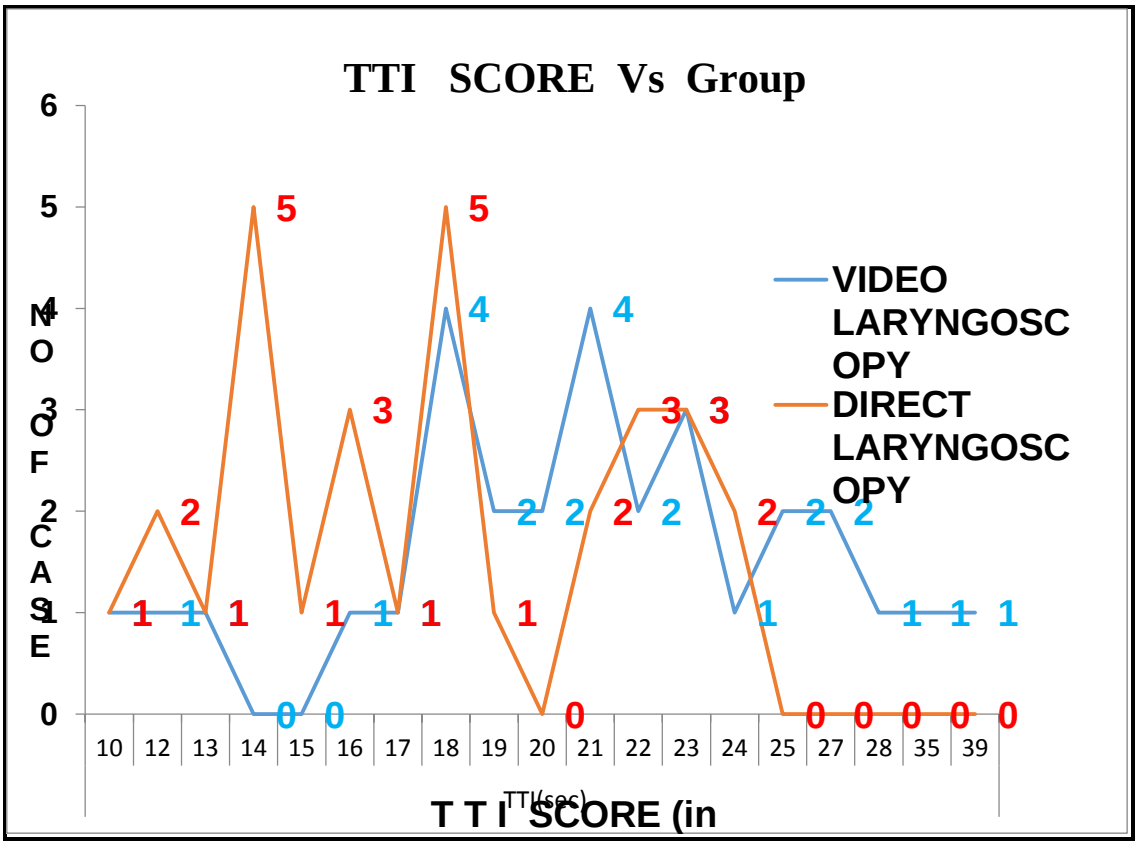


TTI (sec)

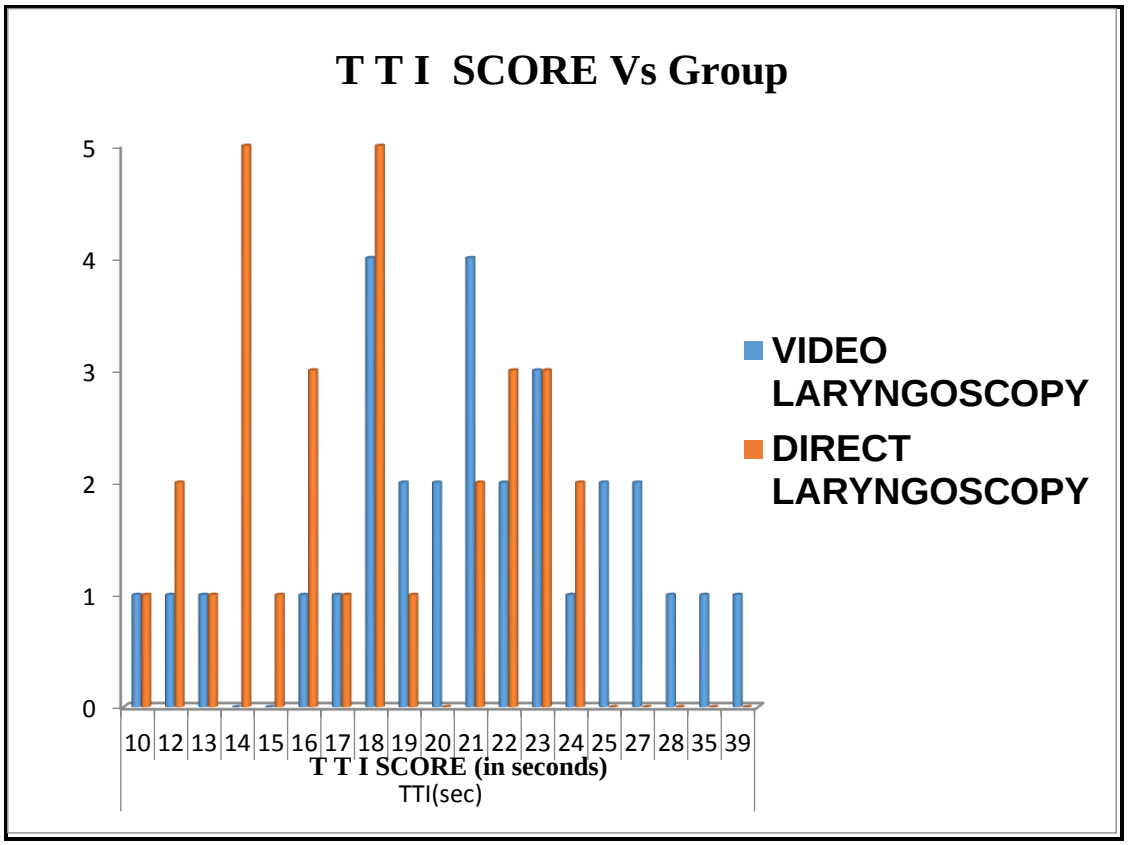
Group	Mean	Standard Deviation
VIDEO LARYNGOSCOPY	21.50	5.99
DIRECT LARYNGOSCOPY	17.70	4.04
t-value	2.88	
p-value	0.01	
Significant	**Significant**	

Mean time taken to intubate was 21.50 sec (SD=5.99) & 17.70 sec (SD=4.04) for video & direct laryngoscopy respectively. It is statistically significant.(p=0.01)


T T I Mean Score
21.5
17.7
25
20
15
10
5
0
MEAN SCORE
VIDEO LARYNGOSCOPY
DIRECT LARYNGOSCOPY
STUDY GROUP


TTI SCORE Vs Group
6
5
4
3
2
1
0
NO OF CASES
10 12 13 14 15 16 17 18 19 20 21 22 23 24 25 27 28 35 39
TTI(sec)
VIDEO LARYNGOSCOPY
DIRECT LARYNGOSCOPY
T T I SCORE (in

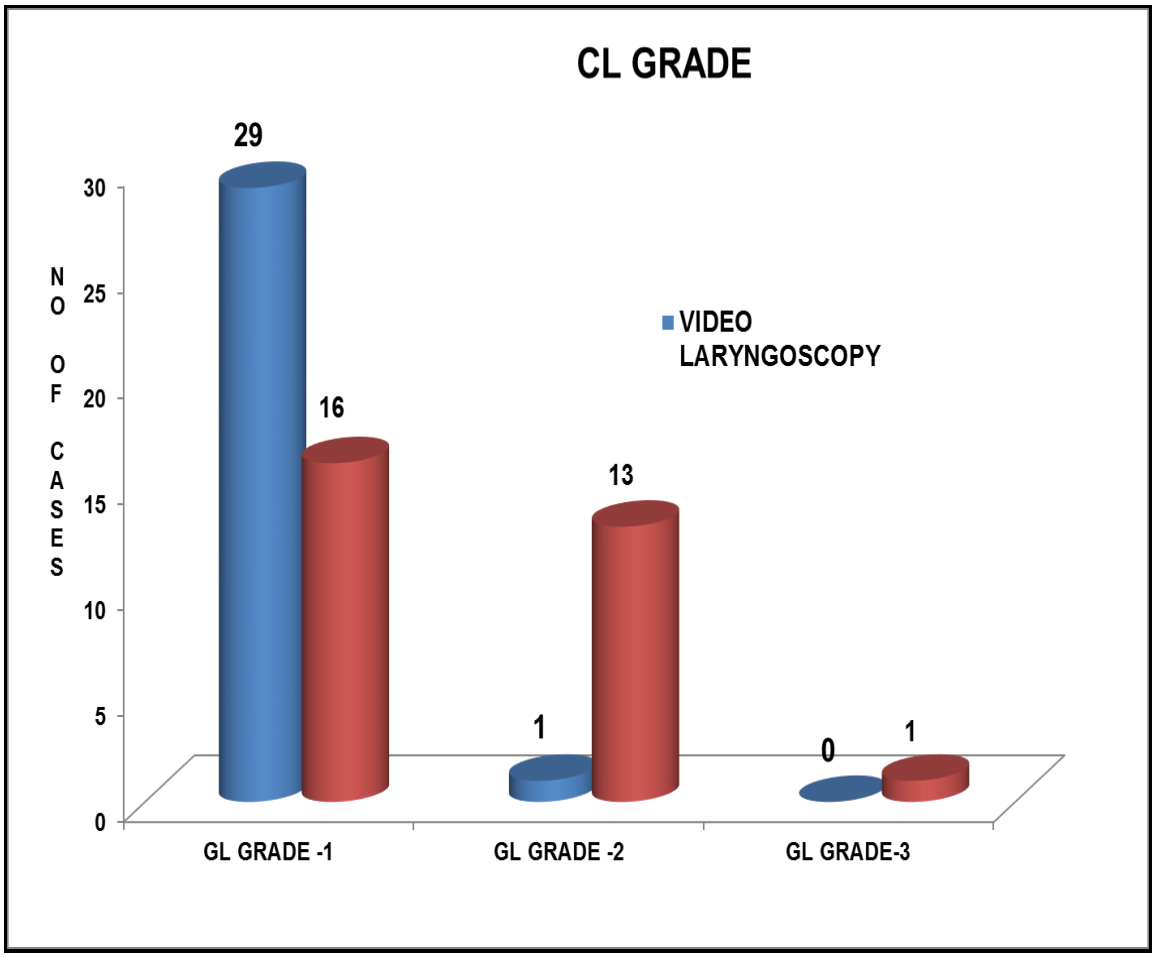
TTI SCORE VERSUS GROUP



CL GRADE

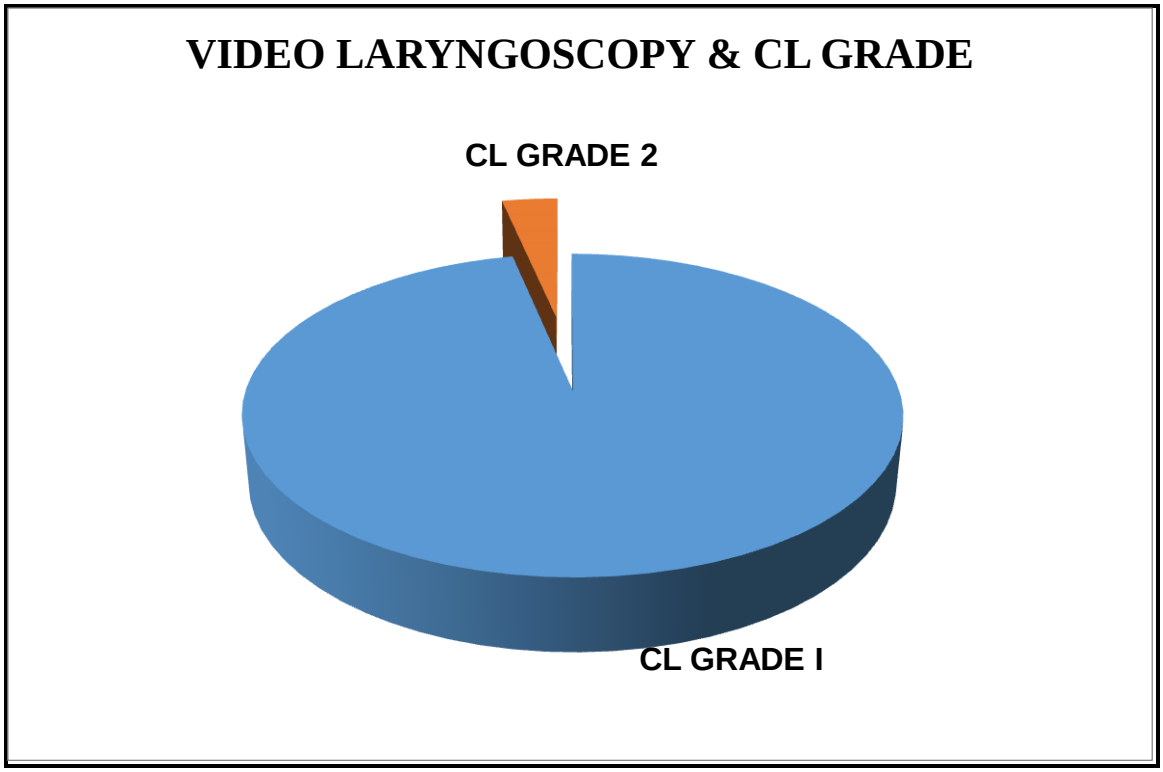
Group	Mean	Standard Deviation
VIDEO LARYNGOSCOPY	1.03	0.18
DIRECT LARYNGOSCOPY	1.50	0.57
t-value	4.26	
p-value	0.000	
Significant	**Significant**	

CL GRADE	VIDEO LARYNGOSCOPY		DIRECT LARYNGOSCOPY	
	No of Patients (N)	Percentage (%)	No of Patients (N)	Percentage (%)
1	29	96.67	16	53.34
2	1	3.33	13	43.33
3	0	0	1	3.33
TOTAL	30	100	30	100
Chi square	15.04			
p-value	0.001			
Significant	**Significant**			

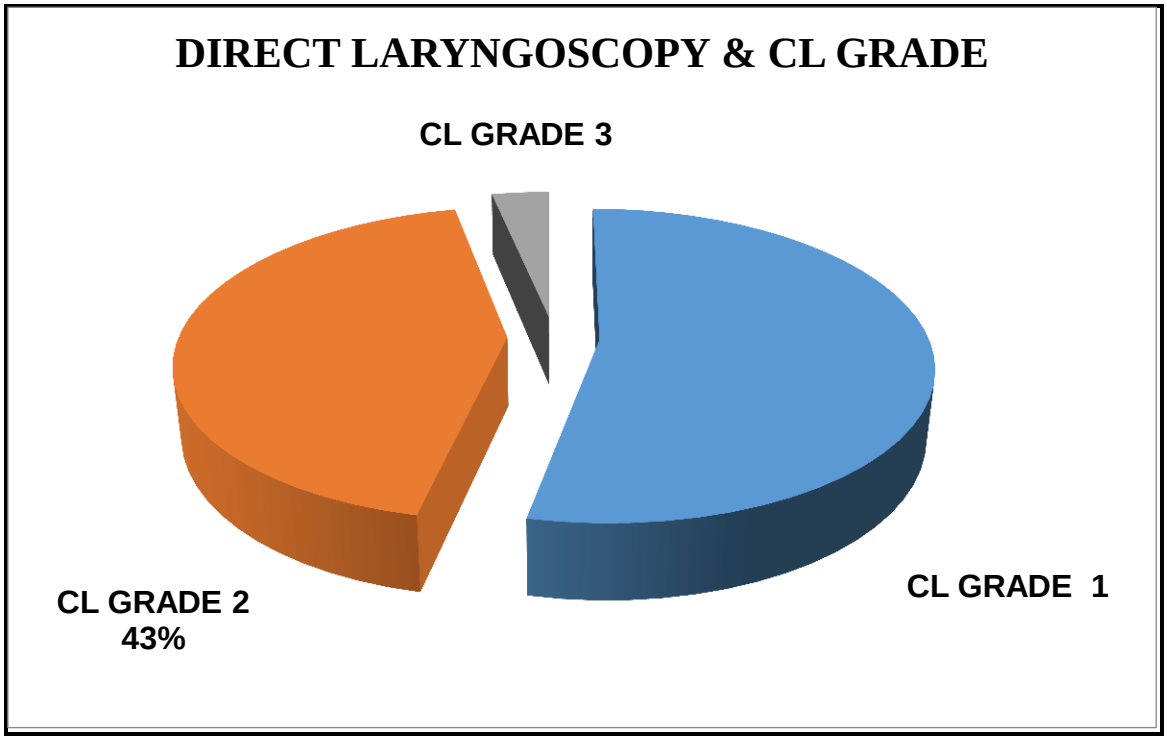


Cormack-lehane grades of laryngeal view compared between the two groups using chi-square test and paired-t test. The results show statistical significance (p=0.001). This shows improved laryngeal view obtained with video laryngoscope than Macintosh laryngoscope.

VIDEO LARYNGOSCOPY & CL GRADE



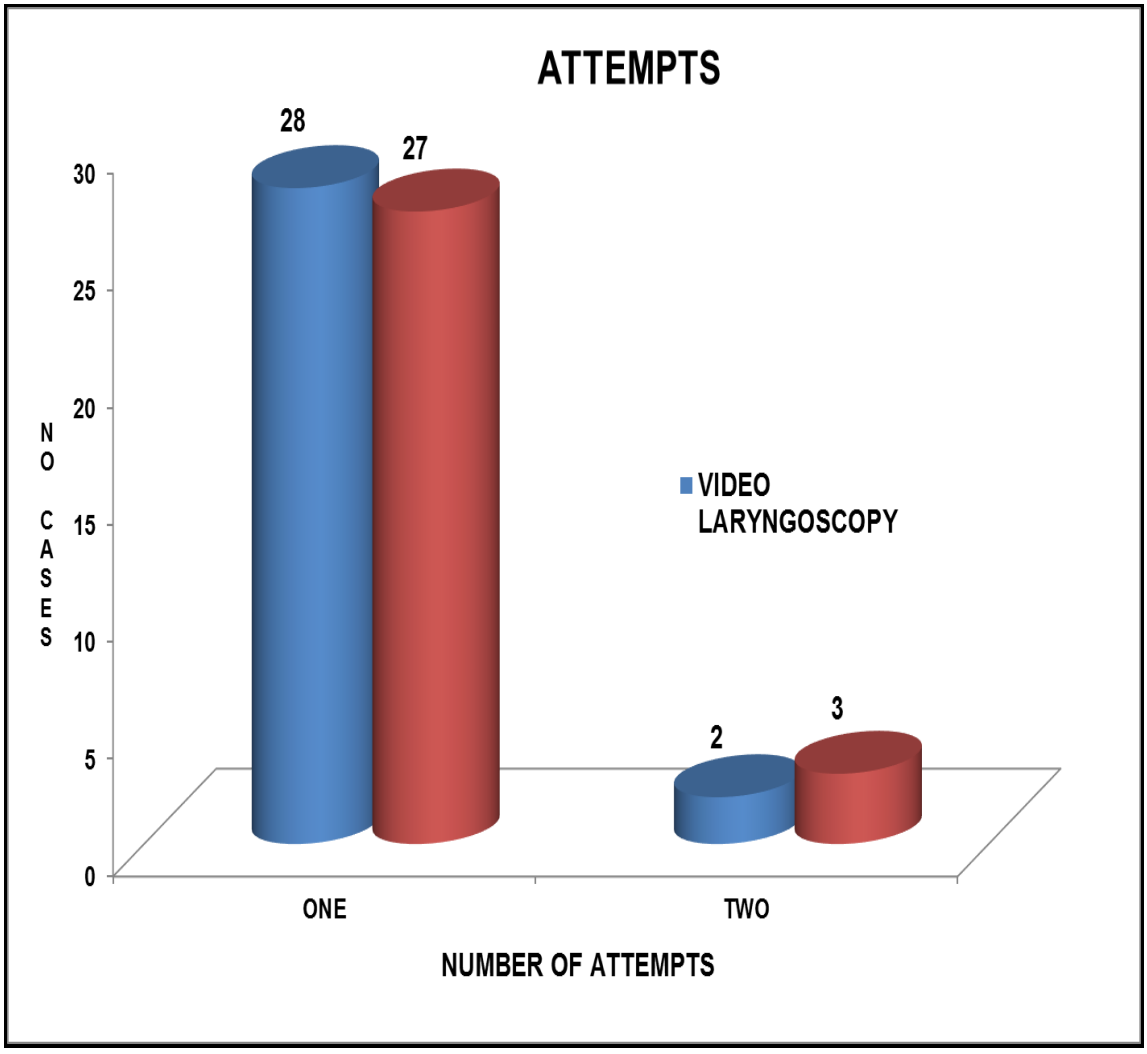
DIRECT LARYNGOSCOPY & CL GRADE



NUMBER OF ATTEMPTS

Group	Mean	Standard Deviation
VIDEO LARYNGOSCOPY	1.07	0.25
DIRECT LARYNGOSCOPY	1.10	0.31
t-value	0.46	
p-value	0.65	
Significant	**Not Significant**	

No of Attempt	VIDEO LARYNGOSCOPY		DIRECT LARYNGOSCOPY	
	No of Patients (N)	Percentage (%)	No of Patients (N)	Percentage (%)
1	28	93.33	27	90.00
2	2	6.67	3	10.00
TOTAL	30	100	30	100
Chi square	0.22			
p-value	0.64			
Significant	**Not Significant**			



There is no statistical significance in both the groups when the number of attempts were compared. (p=0.64)

DISCUSSION

Expert airway management is an essential skill of an Anaesthesiologist.

Direct laryngoscopy using Macintosh laryngoscope has been used for laryngoscopy and intubation since 1940's. Video laryngoscope has been introduced to provide better laryngoscopic view especially on a video monitor and it can also improve ease of intubation. The use of video laryngoscope in intubation is well established and has been extensively supported in the literature for managing the normal and difficult airway. But its use for routine paediatric elective cases has not been studied in detail.

Video laryngoscopes have been designed using fibre optic principle to provide better view of objects situated more anterior to straight line of vision. It is deemed to be useful in situations where conventional laryngoscopy fails to get desired laryngeal view. Trial reports available so far have shown improvement in laryngeal view.

The advantages of the Video laryngoscope from the available literatures include

- As the axis of laryngoscope is curved and the image is transmitted through the fibre optic cable, the alignment of axes may not be needed – improved intubating conditions in patients.
- Useful when there is altered anatomy and when contraindications for Magill's positioning are present.
- The displayed anatomy is magnified.
- Recognition of the anatomical structures and anomalies are easier
- Manipulation of airway devices is facilitated.
- When assistance is required, the operator and assistant can coordinate their movements because each sees exactly the same image on the video monitor.
- Airway illumination provided by the endoscope was judged to be equal to that of a standard laryngoscope.
- The oxygen flow at the tip of the scope not only protected the lens against fogging up and secretions, but

simultaneously allowed apnoeic oxygenation during laryngoscopy.

- An excellent tool for demonstration, teaching and monitoring conventional laryngoscopy.
- Video-recording enables documentation and review of the intubation sequence later on.
- Video-display from the distal blade gives a better view of the cords and as the patients were intubated under monitor control without much force during laryngoscopy or head-neck manipulations.

There are also disadvantages like – Difficulty during learning curve & Difficulty in patients with limited mouth opening.

Our study was designed to compare the intubating conditions of video laryngoscope with conventionally used Macintosh laryngoscope.

60 ASA I-II patients were randomly chosen and assigned into two study groups.

IMPROVEMENT IN LARYNGEAL VIEW:

Laryngoscopic view was recorded using the Cormack-Lehane grading in both the groups. In video laryngoscopy group, 96.67% of the patients had CL grade I view whereas 53.34% of patients in direct laryngoscopy group. 3.33% in videoscope group has Grade II views when compared to 43.33% in direct laryngoscopy group. The results showed statistical significance (p=0.001) when analysed with chi square test (pearson) and paired t test. This shows improved laryngoscopic view with video laryngoscopy when compared with direct standard laryngoscope.

This result is comparable to the study conducted by Macnair MB et al where video laryngoscopy improved the laryngoscopic view(p=0.02).

The study conducted by Riveros et al(Truview pcd and Glidescope with direct laryngoscope) suggested that laryngoscopic views obtained with video scopes were not better then in direct laryngoscopes(p=0.18) in 134 patients[5].

In a study conducted by Karsli et al[8] comparing the Glidescope and direct laryngoscope in paediatrics, they observed significant superior laryngeal view with video laryngoscope(p=0.003) with BURP & (p=0.004) without BURP when compared with standard laryngoscope in eighteen subjects.

TIME VARIABLES IN VISUALISATION AND INTUBATION

Time taken for best visualisation of glottis(TTBV)

In our study, the time taken from the moment of entry of device to best view of larynx was recorded. There was statistical significance since the mean TTBV is 5.67 sec for video laryngoscope group where as it was 4.83 sec in direct laryngoscope group(p=0.001) using paired t test. Hence the time taken for best view is more in case of video laryngoscopy than in direct laryngoscopy.

In similar study conducted by Vlatten et al[1], mean TTBV in VL was 7 sec and 5.5 sec in DL (p=0.006).This result is similar with our study result.

In a study conducted by Macnair MB et al[2], they observed that time for best views is lesser in VL group(median=8.1 sec) than in DL group(median=9.9 sec). p value 0.03.This was in contrary to our observations.

Karsli et al[8] comparison study showed that time taken for optimal view in VL group was(mean= 26sec) and (mean=20sec) in DL group showing that TTBV is lesser in DL group similar to our observations.

Time Taken For Intubation(TTI):

In our study the time taken taken to intubate for VL group was (mean=21.50sec) and for DL group(mean=17.70sec) which shows statistical significance (p=0.01). Thus time taken for intubation was more in video laryngoscopy than direct laryngoscopy.

This observation is supported by the study conducted by Vlatten MD et al[1] in which TTI in VL group was(27 sec) & (21sec) in DL group showing that VL takes longer time for intubation than DL similar ito our study.

The study conducted by Macnair MB et al[2] also showed similarity to our results in intubation time since the median time for intubation in VL group was 22.5sec when compared to 16sec in DL group.

In a similar study conducted by Fiadjoe et al[3] they observed that there was no difference in time for intubation between the Glidescope group and the conventional group(p=0.24). Michelle white et al study also similar to the observations in Fiadjoe et al study that there was no significance in intubation time between VL and DL groups unlike our observation.

Number of Attempts:

In our study comparing the number of attempts needed did not show any statistical difference between the video and direct laryngoscope.

(p value 0.64 using chi square).

SUMMARY

“Seeing is believing”

Video laryngoscope has already started gaining popularity in the new era of perioperative medicine because of its magnified and clear images of the larynx. Already Video laryngoscope has established a firm place in the airway gadgets cart in adult patients. But it is still in the juvenile stage in the field of paediatrics because of less number of available studies in comparing with normal conventional direct laryngoscope.

Hence we have compared these two major types of laryngoscopes in paediatric population in terms of time taken for best views of glottis, time taken for intubation, Cormack Lehane Grades, number of attempts needed to intubate with each type of laryngoscope.

This study was performed on 60 ASA I-II physical status paediatric patients who were undergoing elective surgeries under general anaesthesia. The ethics committee approval and the parental consent were obtained before starting the study. The

study was a single blinded randomised study and the observations were done by the author after inducing general anaesthesia with a standard protocol.

We observed significant difference between the two laryngoscopes in terms of laryngoscopic view of Cormack Lehane grading. The glottic view was better in Video laryngoscope than in direct laryngoscope. There is no significant difference in the number of attempts needed for intubation between the two groups. There is also significant difference in the time variables between the two laryngoscopes. Time taken for best view of glottis and Time taken for intubation was significantly longer in Video laryngoscope than direct laryngoscopy.

CONCLUSION

We hereby conclude that, Video laryngoscope gives a better visual quality in terms of improved and magnified glottic view when compared to the direct conventional laryngoscope in paediatric patients but at the cost of slightly longer time for better visualisation and intubation. Further experience and conclusions drawn from more randomized clinical trials should be documented before introducing Video laryngoscopy as an alternative to the gold standard technique of direct laryngoscopy.

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INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI-3

EC Reg No.ECR/270/Inst./TN/2013
Telephone No. 044 25305301
Fax : 044 25363970

CERTIFICATE OF APPROVAL

To
Dr. Karthikeyan. J
Postgraduate MD (Anaesthesia),
Madras Medical College,
Chennai – 600 003.

Dear Dr. Karthikeyan. J

The Institutional Ethics Committee has considered your request and approved your study titled **"A Prospective randomized study comparing the video laryngoscope and standard direct laryngoscopy for intubation in the Pediatric airway" No.**36082014.

The following members of Ethics Committee were present in the meeting held on 05.08.2014 conducted at Madras Medical College, Chennai-3.

1. Dr.C.Rajendran, M.D.,	: Chairperson
2. Dr.R.Vimala, M.D., Dean, MMC, Ch-3	: Deputy Chairperson
3. Prof.B.Kalaiselvi, M.D., Vice-Principal, MMC, Ch-3	: Member Secretary
4. Prof.R.Nandhini, M.D., Inst.of Pharmacology, MMC	: Member
5. Dr.G.Muralidharan, Director Incharge, Inst.of Surgery	: Member
6. Prof.K.Ramadevi, Director i/c, Inst.of Biochemistry, MMC	: Member
7. Prof.Saraswathy, M.D., Director, Pathology, MMC, Ch-3	: Member
8. Prof.Tito, M.D., Director i/c, Inst.of Internal Medicine, MMC	: Member
9. Thiru S.Rameshkumar, Administrative Officer	: Lay Person
10. Thiru S.Govindasamy, B.A., B.L.,	: Lawyer
11. Tmt.Arnold Saulina, M.A., MSW.,	: Social Scientist

We approve the proposal to be conducted in its presented form.

Sd/ Chairman & Other Members

The Institutional Ethics Committee expects to be informed about the progress of the study and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.

Member Secretary, Ethics Committee

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE
CHENNAI-600 003

PATIENT CONSENT FORM

Study title : "A Prospective, randomized study comparing the video laryngoscope and standard direct laryngoscopy for intubation in the Paediatric airway."

Study centre : Department of Anaesthesiology ,

Institute Of Child Health,

Madras Medical College,

Chennai-8

Participant Name: Age: Sex: I.P. No:
Participant Patent Name:

I confirm that I have understood the purpose of procedure for the above study. I have the opportunity to ask the question and all my questions and doubts have been answered to my satisfaction.

I have been explained about the pitfall in the procedure. I have been explained about the safety, advantage and disadvantage of the technique.

I understand that my child's participation in the study is voluntary and that I am free to withdraw at anytime without giving any reason.

I understand that the Investigator, regulatory authorities and the ethical committee will not need my permission to look at my child's health records both in respect to current study and any further research that may be conducted in relation to it, even if I withdraw from the study. I understand that my child's identity will not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from the study.

Time

Date: Signature of Parent/Guardian

Place: Patient Name:

Signature of the Investigator: Name of the Investigator:

INFORMATION TO PARTICIPANTS

Investigator : Dr. KARTHIKEYAN.J

Name of the Participant :

Name of the Participant Parent:

Title : "A Prospective, randomized study comparing the video laryngoscope and standard direct laryngoscopy for intubation in the Paediatric airway."

You are invited to take part in this research study. We have got approval from the IEC. You are asked to participate because you satisfy the eligibility criteria .We want to compare and study the intubating conditions with video laryngoscope and Macintosh laryngoscope in elective paediatric surgical patients.

What is the Purpose of the Research?

There are several critical differences in anatomy between paediatric and adult airway. This study is to compare the intubating conditions with video laryngoscope and direct laryngoscopy in elective paediatric surgical patients with respect to,

1. Visual quality and ease of intubation,
2. Intubation time,
3. Advantages of using video laryngoscope

The Study Design:

All the patients in the study will be divided into two groups.

Group1- Intubation with Video Laryngoscope.

Group 2- Intubation with Direct (Macintosh laryngoscope)

All patients will be given general anaesthesia

Benefits

Intubation Using Video Laryngoscope improves visual quality of Glottis with expanded high resolution view and enhances the ease of intubation

Discomforts and risks

Injury to teeth and tongue

Post operative sore throat and infections

This intervention has been shown to be well tolerated as shown by previous studies. And if you do not want to participate you will have alternative of setting the standard treatment and your safety is our prime concern.

Time :
Date :
Place :

Signature / Thumb Impression of Parent/Guardian
Patient Name:

Signature of the Investigator : _____

Name of the Investigator : _____

PROFORMA

DATE: ROLL NO: AIRWAY DEVICE:

NAME:

AGE: SEX: IP NO:

DIAGNOSIS:

SURGICAL PROCEDURE DONE:

Ht: CVS: HR:

Wt: RS:

PRE OP ASSESSMENT:

HISTORY: Any Co-morbid illness

H/O Documented Difficult Airway

H/O previous surgeries

MEASURES OF STUDY OUTCOME:

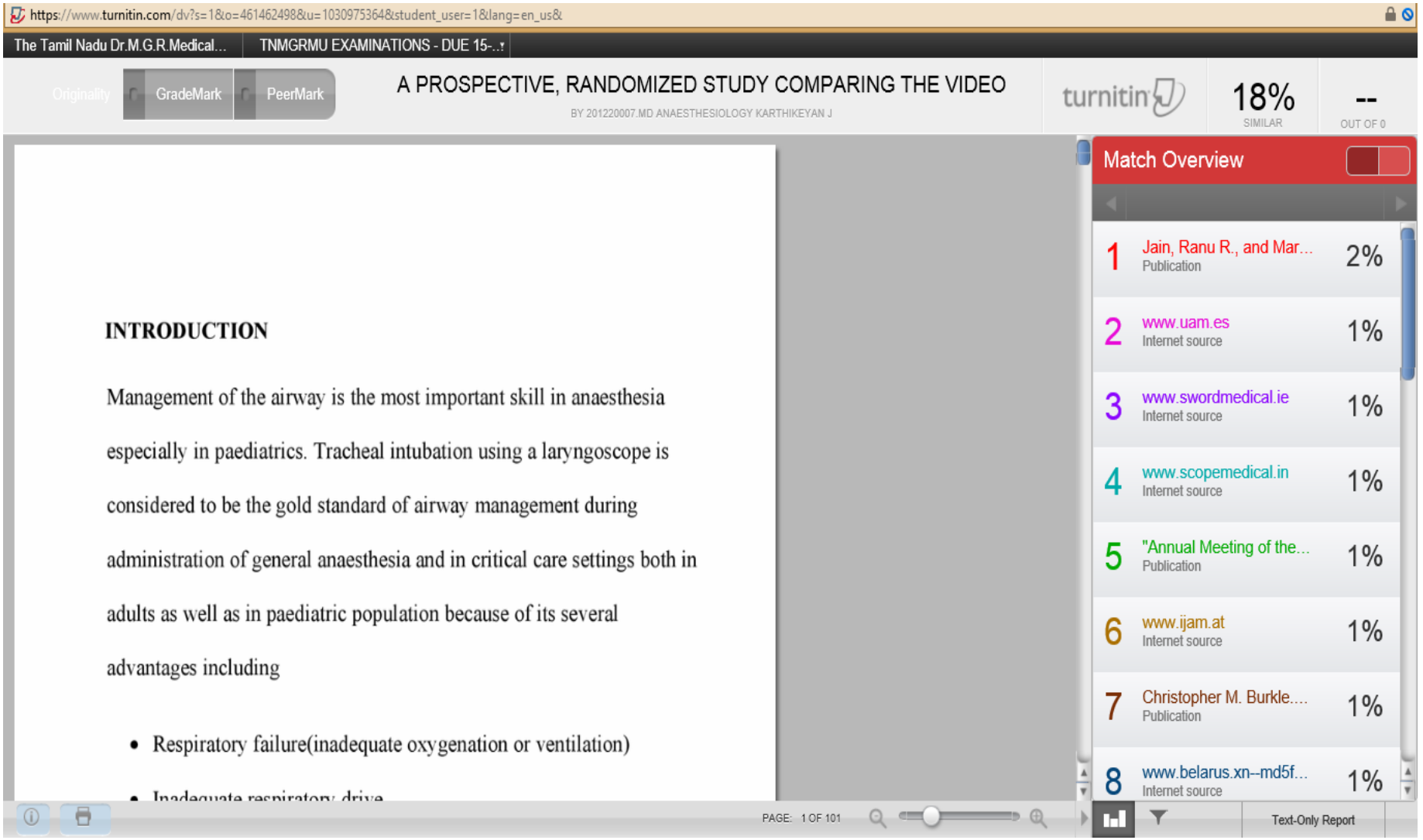
TYPE OF SCOPY

NUMBER OF ATTEMPTS

TTBV

TTI

CL Grading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INTRODUCTION
Management of the airway is the most important skill in anaesthesia especially in paediatrics. Tracheal intubation using a laryngoscope is considered to be the gold standard of airway management during administration of general anaesthesia and in critical care settings both in adults as well as in paediatric population because of its several advantages including
• Respiratory failure(inadequate oxygenation or ventilation)
• Inadequate respiratory drive
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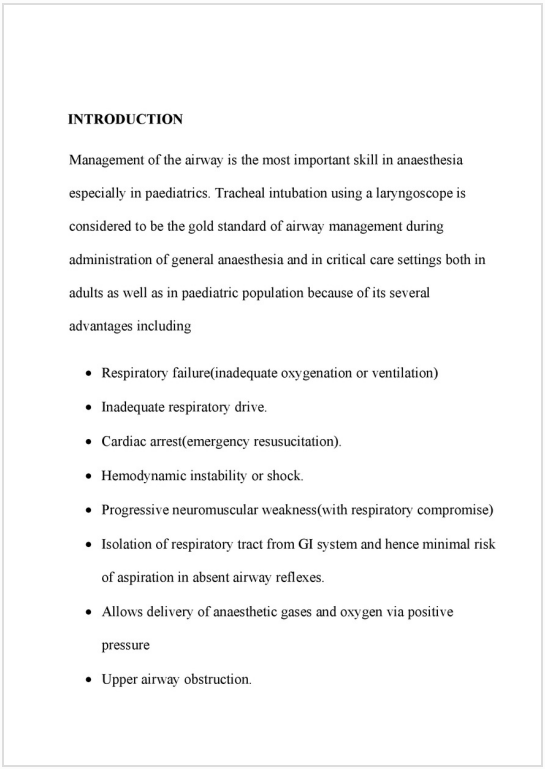

INTRODUCTION

Management of the airway is the most important skill in anaesthesia especially in paediatrics. Tracheal intubation using a laryngoscope is considered to be the gold standard of airway management during administration of general anaesthesia and in critical care settings both in adults as well as in paediatric population because of its several advantages including

- Respiratory failure(inadequate oxygenation or ventilation)
- Inadequate respiratory drive.
- Cardiac arrest(emergency resusucitation).
- Hemodynamic instability or shock.
- Progressive neuromuscular weakness(with respiratory compromise)
- Isolation of respiratory tract from GI system and hence minimal risk of aspiration in absent airway reflexes.
- Allows delivery of anaesthetic gases and oxygen via positive pressure
- Upper airway obstruction.

VIDEO LARYNGOSCOPY									
S.NO	NAME OF THE PATIENT	AGE/SEX	IP NO:	DIAGNOSIS	PROCEDURE	TTBV(sec)	TTI(sec)	CL GRADE	Number of Attempts
1	Myla	10/fch	819882	Empyema thoracis (left)	Decortication	5	21	1	1
2	Lavanya	4/fch	821546	cystic hygroma	Excision	6	22	2	1
3	Nitish	6/mch	821188	undescended testis (Rt)	lap orchidopexy	5	28	1	1
4	Gunasekar	11/mch	822071	undescended testis (Lt)	lap orchidopexy	4	18	1	1
5	Nancy	6/fch	821157	chronic adenotonsillitis	enucleation and curettage	5	25	1	1
6	Barani	8/fch	821163	chronic adenotonsillitis	enucleation and curettage	5	23	1	1
7	preethi	10/fch	821164	chronic adenotonsillitis	enucleation and curettage	5	25	1	1
8	marimuthu	11/mch	821186	chronic adenotonsillitis	enucleation and curettage	3	13	1	1
9	Dinesh	2/mch	820861	Adenoid hypertrophy	adenoidectomy	5	18	1	1
10	vidya barathi	11/fch	820774	cbd injury	hepaticojejunostomy	4	19	1	1
11	Riyas	4/mch	823078	lt np undescended testis	lap orchidopexy	5	20	1	1
12	Dharshini	7/fch	820441	chronic adenotonsillitis	enucleation and curettage	5	21	1	1
13	Srinath	10/mch	820389	chronic adenotonsillitis	enucleation and curettage	4	16	1	1
14	Sameen	10/fch	820453	chronic adenotonsillitis	enucleation and curettage	5	17	1	1

S.NO	NAME OF THE PATIENT	AGE/SEX	IP NO:	DIAGNOSIS	PROCEDURE	TTBV(sec)	TTI(sec)	CL GRADE	Number of Attempts
15	krithiga	9/fch	820467	chronic adenotonsillitis	enucleation and curettage	5	18	1	1
16	santhosh	7/mch	820501	chronic adenotonsillitis	enucleation and curettage	4	35	1	2
17	Perarusu	7/mch	820202	Rt Undescended testis	lap orchidopexy	5	23	1	1
18	Lavanya	2/fch	820072	supraumbilical hernia	Hernia repair	4	39	1	2
19	Akash	4/mch	819643	Gallbladder stone	lap cholecystectomy	5	12	1	1
20	Karthik	3/mch	818288	lt np undescended testis	lap orchidopexy	6	22	1	1
21	Jitheshwaran	3/mch	819659	Rt Undescended testis	lap orchidopexy	5	27	1	1
22	Pavan	4/mch	818965	lt megaureter	lt ureteric reimplantation	6	18	1	1
23	Martin	5/mch	819740	chronic adenotonsillitis	enucleation and curettage	5	21	1	1
24	sasi	5/mch	819765	chronic adenotonsillitis	enucleation and curettage	4	23	1	1
25	chandini	7/fch	819767	chronic adenotonsillitis	enucleation and curettage	5	21	1	1
26	Rubeshwaran	10/mch	819763	chronic adenotonsillitis	enucleation and curettage	5	24	1	1
27	Karthikumari	2/mch	818209	B/L double moiety	Right nephrectomy	4	10	1	1
28	Libisha	6/fch	819165	chronic adenotonsillitis	enucleation and curettage	5	19	1	1
29	Rakshiabala	6/fch	819383	chronic adenotonsillitis	enucleation and curettage	5	20	1	1
30	Vadivel	7/mch	819850	chronic adenotonsillitis	enucleation and curettage	6	27	1	1

DIRECT LARYNGOSCOPY									
S.NO	NAME OF THE PATIENT	AGE/SEX	IP NO:	DIAGNOSIS	PROCEDURE	TTBV(sec)	TTI(sec)	CL GRADE	Number of Attempts
1	Karthik	3/mch		Lt distal megaureter	B/L reimplantation	5	21	2	1
2	Sushima	11/f		chronic adenotonsillitis	Enucleation and curettage	6	23	3	2
3	Deva	2/mch		Anorectal malformations	PSARP	4	19	2	1
4	Rakshibala	2/mch		chronic adenotonsillitis	Enucleation and curettage	5	14	1	1
5	Santhakumar	5/mch		chronic adenotonsillitis	Enucleation and curettage	7	22	2	1
6	Mohammed bilal	4/mch		colostomy in situ	colostomy closure	5	15	2	1
7	Yuvaraj	8/mch		PSARP colostomy in situ	colostomy closure	4	12	1	1
8	Shiny	11/fch		LT pujo	pyeloplasty	8	22	2	1
9	Shreevatsan	11/mch		Rt non palpable Udt	Lap orchidopexy	5	14	1	1
10	vadivel	9/mch		chronic adenotonsillitis	Enucleation and curettage	5	12	2	1
11	Gopika	9/mch		chronic adenotonsillitis	Enucleation and curettage	6	18	1	1
12	Moideen ahmed	11/mch		chronic adenotonsillitis	Enucleation and curettage	6	16	1	1
13	Sandhya	8/fch		chronic adenotonsillitis	Enucleation and curettage	6	22	2	1
14	Ajish mohammed	10/mch		chronic adenotonsillitis	Enucleation and curettage	5	23	2	1
15	Jayashree	10/fch		chronic adenotonsillitis	Enucleation and curettage	5	24	2	1
16	Boopesh	1/mch		rt puj obstruction	Rt pyeloplasty	6	23	2	2
17	Dhareen	5/fch		colostomy in situ	colostomy closure	7	17	1	1
18	Harsha	1/mch		choledochol cyst	excision	7	18	1	1
19	Tarun	2/mch		Lt non palpable UDT	lap orchidopexy	9	21	1	2

S.NO	NAME OF THE PATIENT	AGE/SEX	IP NO:	DIAGNOSIS	PROCEDURE	TTBV(sec)	TTI(sec)	CL GRADE	Number of Attempts
20	Lavanya	9/fch		chronic adenotonsillitis	Enucleation and curettage	5	14	1	1
21	sathish	11/mch		chronic adenotonsillitis	Enucleation and curettage	6	18	2	1
22	Mithun	5/mch		chronic adenotonsillitis	Enucleation and curettage	4	10	1	1
23	Harinath	11/mch		chronic sinusitis	FESS	6	16	2	1
24	Vijendra	7/mch		Fungal sinusitis	FESS	5	14	1	1
25	Pradeep	1/mch		Lt non functioning kidney	Lt nephroureterctomy	5	13	1	1
26	Lavanya	9/fch		chronic adenotonsillitis	Enucleation and curettage	6	18	1	1
27	Sathyaraj	3/mch		Rt puj obstruction	pyeloplasty	6	16	1	1
28	Geethanjali	10/fch		chronic adenotonsillitis	Enucleation and curettage	5	14	1	1
29	Kirankumar	6/mch		chronic adenotonsillitis	Enucleation and curettage	6	24	2	1
30	Loganathan	11/mch		chronic adenotonsillitis	Enucleation and curettage	5	18	1	1